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SELECTED

ESOURCESABSTRACTS

VOLUME 1, NUMBER 8 AUGUST 1968



Selected Water Resources Abstracts includes abstracts of current monographs, journal articles, translations, and reports. The contents of these documents cover the physical, life, and social science, as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water.

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SELECTED WATER RESOURCES ABSTRACTS

VOLUME 1, NUMBER 8 AUGUST 1968

UNITED STATES DEPARTMENT OF THE INTERIOR
WATER RESOURCES SCIENTIFIC INFORMATION CENTER

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ADMINISTRATION AND MANAGEMENT

R202947X68A PLANNING, PROGRAMMING & BUDGETING IN GOVT Planning ahead is not a new concept. Government agencies and business organizations have always planned to some extent, but since World War II, significant changes have been made in the procedures used. Planning was originally an informal procedure, practiced more or less independently by a number of departments within an organization, to establish shortrun operating policies. Planning has since become a formalized, integrated process for establishing long-range objectives and translating them into quantitative terms, making assumptions about future conditions or events, weighing different courses of action and selecting the most suitable one, and using measures of effectiveness to evaluate results. Primary characteristics of a Planning, Programming and Budgeting (PPB) system are: (1) identification of fundamental objectives of a department with all activities related to these goals; (2) explicit identification of future year implications; (3) consideration of all pertinent costs; and (4) performance of systematic analyses to identify objectives, determine alternative ways of achieving them and estimate cost and expected results of each alternative. PPB is an instrument for generating conditions and pointing the way for intelligent and productive decision making.

R202947X68A

Murphy, Joseph S

PLANNING, PROGRAMMING & BUDGETING--THE QUIET REVOLUTION IN GOVERNMENT PLANNING TECHNIQUES

Manage Rev, Vol 57, No 4, pp 4-11, Apr 1968. 8 p, 1 tab

Office of Economic Opportunity, Washington D C

DESCRIPTORS./ *planning/ *programs/ *budgets/ administration/ computers/ data processing systems/ policy matters/ decision making/ efficiencies/ reasoning/ control/ analysis/ operations/ coordination/ *scheduling/ costs/ management

IDENTIFIERS--/ *long-term planning/ procedures/ management planning/ PPB System/ ideas/ reports/ evaluation/ optimization/ Federal agencies

R202988X68A HOW TO SHARPEN LISTENING SKILLS The technical professional, middle, or upper management level employee spends 45% of his workday listening. Improving listening skills increases his interpersonnel communications and general proficiency. Good listening enhances learning, thinking, problem solving, and decisionmaking, develops self-confidence, and is a help in selling. Awareness of listening deficiencies helps in mastering the art of good listening. Types of deficiencies that can be overcome are (1) lack of interest; (2) hasty evaluation or prejudgment; (3) greater concern for delivery than content; (4) emotionalism toward content, based on prejudice or previous conviction; (5) faked attention; (6) inability to concentrate; (7) failure to comprehend difficult material; (8) attention to distractions; (9) interest in individual facts instead of central ideas; (10) emotional deafness to loaded keywords, causing mental dissipation; (11) meticulous note-taking; (12) a know-it-all attitude; and (13) failure to adapt thought speed to speaker's speed. A good listening test and description of available listening lessons are given.

R202988X68A

Raudsepp, Eugene

HOW TO SHARPEN YOUR LISTENING SKILLS

Mach Design, Vol 40, No 11, pp 148-152, May 1968. 5 p, 1 photo

Princeton Creative Research Inc, N J

DESCRIPTORS-/ management/ training/ professional personnel/ decision making/ work/ efficiencies/ employee relations/ *communications/ behavior (psychology)/ reasoning/ *human behavior/ *concentration/ values/ analysis/ motivation/ disturbances/ learning

IDENTIFIERS-/ *listening/ ideas/ problem solving/ communication tools/
professional development/ *self-improvement

ADMINISTRATION AND MANAGEMENT

R202994 68A ATTRIBUTES OF A GOOD MANAGER

Every supervisor reflects his personal characteristics in the methods used to attain an efficient, high-morale department. But certain basic unchanging principles underlie the wide variety of individual touches a supervisor may put on his managerial style. A supervisor should use these principles flexibly to adjust his approach to his job, his department, and his personality. Some basic managerial principles used by a good supervisor include: (1) setting a good example; (2) encouraging cooperation; (3) building morale; (4) backing his people; (5) delegating; (6) treating each worker individually; (7) inspiring confidence; (8) not weakening under pressure; (9) understanding himself; and (10) being versatile, openminded, well organized, noncomplacent, patient, and concerned with the entire organization. Each of these managerial principles is discussed in the paper.

R202994 68A

Cribbin, James J

WHAT MAKES A GOOD MANAGER

Supervisory Manage, Vol 13, No 5, pp 2-6, May 1968. 5 p

St. John's University, Collegeville, Minn

DESCRIPTORS... / *management/ *supervision/ *personnel management/ human behavior/ psychology/ employee relations/ *leadership/ coordination/ motivation/ responsibilites/ professional personnel

identifiers.. / performance/ evaluation/ clarity/ recognition/ *morale/ *cooperation/ objectives

R203002X68A WRITING A STATE-OF-THE-ART REPORT State-of-the-art reports are being used more frequently to summarize, evaluate, and disseminate current technological information and data. This type of report is defined as a comprehensive analysis of available knowledge (published and unpublished) on the status of a particular subject area and is frequently written for the use of a specific reader audience. These reports are often highly mission-oriented and may be part of a research and development program or a step in management decision-making. Scientists or engineers selected to generate such reports must be recognized authorities working in specific subject areas. State-of-the-art reports are a difficult form of technical writing. The writer must have adequate time to donate to the task; an organized team approach can frequently be helpful to him. Once a state-of-the-art report has been completed, followup of new advances in the area and updating of the report are facilitated. Detailed guidelines are given for preparing these reports.

R203002X68A

Darby, Ralph L and Veazie, Walter H

WRITING A STATE-OF-THE-ART REPORT

Mater Res Stand, Vol 8, No 5, pp 28-32, May 1968. 5 p, 1 fig, 2 tab, 5 ref

Columbus Laboratories of Battelle Memorial Institute, Ohio

DESCRIPTORS../ *technical writing/ engineering personnel/ scientific personnel/ *reviews/ communications/ management/ information retrieval/ libraries/ research and development/ analysis/ abstracts/ methodology/ technical societies/ decision making/ coordination

IDENTIFIERS.. / information centers/ authors/ clarity/ *report writing/
goals/ writing/ technical papers/ cooperation

R202938 67A WORLDWIDE USE OF AIRPHOTOS IN AGRICULTURE
Use of aerial photographs in agriculture to provide data on agriculture
production and to aid in inventory, planning, and development has increased throughout the world. This is especially true for larger countries where problems of obtaining data over wide areas are acute and for
underdeveloped areas where time is a critical factor in initiating agricultural development. Trained scientists are using airphotos to conduct
surveys and to train counterpart local personnel in countries where U N
Special Fund projects exist. Several underdeveloped countries have expressed a need for regional training centers to instruct people in airphoto use in their working environments. In more developed countries,
major use of airphotos will provide current information on land use and
agricultural changes. A summary is given of airphoto use in several
countries around the world. Has 26 references.

R202938 67A

Dill, Henry W Jr

WORLDWIDE USE OF AIRPHOTOS IN AGRICULTURE

U S Dep Agr Handbook 344, Sept 1967. 23 p, 7 fig, 2 tab, 26 ref

DESCRIPTORS./ *aerial photography/ *agriculture/ planning/ mapping/ maps/ soil classifications/ photography/ soil conservation/ *data collection systems/ land development/ land utilization/ photographs/ vegetation/ water development/ bibliographies/ land classifications

IDENTIFIERS-- / surveys (data collection)/ soil maps/ cropping patterns/ remote sensing/ photointerpretation

R202989X68A HIGH-INTENSITY SOIL SURVEYS High-intensity soil surveys are of greatest value for specific uses when made on aerial photographs at large scales. Cost-benefit ratios are greater than 1 to 100 and can be even greater for very expensive land development. This type of survey is custom made for I use in a given land area, is made upon special request, and is used immediately upon completion. The surveys assist in planning and constructing various facilities ranging from homes and industrial plants to cemeteries. Emphasis on interpretation of soil maps at large scales enables special legends to be devised for each development. Soil research can be performed concurrently with mapping to describe important soil characteristics. This article describes a special soil survey made for a dormitory complex and conference center at Cornell University, and illustrates how high-intensity soil surveys are contributing to orderly planning and development of expensive structures on relatively small areas of land. Has 15 references.

R202989X68A

Olson, Gerald W and Marshall, Raymond L

USING HIGH-INTENSITY SOIL SURVEYS FOR BIG DEVELOPMENT PROJECTS: A CORNELL EXPERIENCE

Soil Sci, Vol 105, No 4, pp 223-231, Apr 1968. 9 p, 4 fig, 2 tab, 15 ref

Cornell University, Ithaca, N Y; Soil Conservation Service, Syracuse, N Y

DESCRIPTORS./ *soil surveys/ *aerial photography/ *land development/ *soil classifications/ soil horizons/ soil moisture/ *soil profiles/ soil science/ planning/ soil physical properties/ mapping/ lacustrine deposits/ land utilization/ land classifications/ benefit-cost ratios/ bibliographies

IDENTIFIERS -- / cost-benefit analysis / *soil maps

R202964 67A ACCLIMATION OF FISH TO LOW OXYGEN This study was undertaken to assess the extent of metabolic adaptation exhibited by fish exposed for relatively short periods of time to low levels of oxygen. Extensive research is being carried out concerning the effects of low oxygen on growth and survival of fish, but less is known of the capacity of fish to adapt metabolically to reduction in dissolved oxygen. Metabolic parameters investigated in the present study are metabolic rate of the whole animal, oxygen consumption of selected tissues, activity levels of certain respiratory enzymes, and levels of energy stores. Red blood cell counts were taken and measurements made of hemoglobin concentration and hematocrit (packed cell volume). Most of the study was done on the bluegill sunfish. A few experiments were performed with other centrarchid fishes; namely, white crappie, yellow perch, and pumpkinseed. The choice of bluegill sunfish as the main experimental animal was due to 2 factors: (1) ease of maintenance in the laboratory, and (2) the fact that this species, and many other centrarchids are exposed to periodic fluctuations in dissolved oxygen in their natural environment, and might be expected to possess mechanisms of physiological adaptation to oxygen stress.

R202964 67A

Pritchard, Austin W

ACCLIMATION OF FISH TO LOW OXYGEN: FINAL REPORT

Public Health Serv Rep, Washington, DC, 1967. 31 p, 8 tab, 4 fig, 7 ref

Oregon State University, Corvallis

DESCRIPTORS... / *oxygen/ reduction/ *fish/ dissolved oxygen/ sunfishes/ fluctuation/ *respiration/ *metabolism/ yellow perch/ fish physiology/ aquatic environment/ environmental effects/ oxygen sag/ circulation (animals)/ *acclimatization/ oxygen requirements

IDENTIFIERS --

R202966 67A ECOLOGY OF CHIRONOMUS PLUMOSUS
The ecology and population dynamics of chronomus plumosus (L) were studied in 4 areas of Lake Winnebago for 3-1/2 yr to gain insight into the factors that cause fluctuations in populations of this insect and to indicate possible methods for biological or cultural control. This study was supported in part by a grant from Winnebago Lake Fly Research, Inc. and by the Public Health Service Grant WP00209.

R202966 67A

Hilsenhoff, William L

ECOLOGY AND POPULATION DYNAMICS OF CHIRONOMUS PLUMOSUS (DIPTERA: CHIRONOMIDAE) IN LAKE WINNEBAGO, WISCONSIN

Reprint, Ann Entomol Soc America, Vol 60, No 6, pp 1183-1194, Nov 1967. 12 p, 5 fig, 2 tab, 7 ref

University of Wisconsin, Madison

DESCRIPTORS. / *ecology/ population/ fluctuation/ insect control/ aquatic environment/ *midges/ *diptera/ biocontrol/ cultural control/ aquatic microbiology/ entomology/ ecological distribution/ migration patterns/ aquatic habitats/ aquatic insects

IDENTIFIERS -- / aquatic ecology / Lake Winnebago, Wisconsin

R202969 67A SALMON MIGRATION AND SPAWNING
From mid-August to mid-November of 1965, the Fisheries Research
Institute conducted a study of the migration and distribution of the
run of adult salmon in the Green-Duwamish River system. The objectives
were: (1) to ascertain the timing and distribution of the run through
the estuary and river, (2) to evaluate the effects of fluctuation in
water quality in the bay and river on the timing and distribution of
the run, (3) to measure the effects of natural environmental factors on
the timing of migration through the river, and (4) to establish the
distribution of natural spawners throughout the system. The program of
field activities included tagging adult salmon, operating a fish
counting station and surveying the natural spawning grounds. The
great majority of the fish tagged were chinook salmon (Oncorhynchus
tshawytscha), consequently most of the observations reported in this
paper concern the run of chinook salmon. Federal Water Pollution

R202969 67A

Miller, Denny M and Stauffer, Gary D

Control Administration Grant WP00642-02.

STUDY OF THE MIGRATION AND SPAWNING DISTRIBUTION OF THE RUNS OF CHINOOK AND COHO IN THE GREEN-DUWAMISH RIVER SYSTEM IN THE FALL OF 1965

Fisheries Res Inst, Univ Washington Circ 67-4, Apr 1967. 21 p, 10 fig, 3 tab, 6 ref

Public Health Service, Washington, D C

DESCRIPTORS-- / distribution/ ecology/ *fish/ *chinook salmon/ *spawning/ *migration/ *salmon/ marking

IDENTIFIERS -- / *coho salmon / Green-Duwamish River, Wash

R202974 67A STUDY OF THE DUWAMISH ESTUARY The objectives, techniques and some results of a study of the Duwamish River, Washington, are presented in this article. Objectives of the study are: (1) to develop a mathematical model to simulate the more important physical and chemical processes of the Duwamish estuary, including the rates of addition and dilution of pollutants, and (2) to investigate the ecology of pelagic and demersal fishes in the estuary and near-shore marine environments affected by industrial waste discharge. To help define the chemical and physical characteristics of the Duwamish estuary 2 empirical techniques, time series analysis and simulation programming, are employed. The tow net and a new massmarking technique provide a means of quantifying information on the distribution, growth, abundance, and mortality of juvenile chinook salmon in estuarine waters. Simulation models may be used to estimate bias and to design sampling strategies that will reduce bias in survival estimates.

R202974 67A

Miller, Denny M; Wetherall, Jerry A; Lenarz, William H

A MODERN APPROACH TO THE STUDY OF ESTUARIES, WITH SPECIFIC REFERENCE TO THE DUWAMISH RIVER, WASHINGTON

Trans 32nd N Amer Wildlife Natur Resources Conf, Wildlife Manage Inst, Washington, DC, pp 165-173, Mar 1967. 9 p, 1 fig, 4 ref

University of Washington, Seattle

DESCRIPTORS... / "ecology/ "estuaries/ simulation/ fish/ water pollution/ stream pollution/ "estuarine environment/ life history studies/ model studies/ mathematical models/ salmonids/ chinook salmon

IDENTIFIERS-- / *Duvamish River, Wash/ pelagic fishes/ demersal fishes

R202959 68A MASS TRANSFER IN AQUEOUS SOLUTIONS One of the current problems in diffusional mass transport is that of formulating models for the multicomponent flux expressions in liquids. It is generally conceded that the inverted form of the so-called Stefan-Maxwell equations adequately describe diffusional phenomena in ideal gases. A corresponding analog has been suggested for liquids. Here, the model for liquids was based on assuming the Stefan-Maxwell analog, and then carrying out the necessary inversion by approximate methods. This model was tested by requiring that it describe diffusion, conductivity, and transport number data in aqueous solutions of several 1-1 electrolytes, over a concentration range of 0 to 1 normal. A steepest ascent numerical procedure was developed to extract a single set of optimum parameters from the experimental data. Using a single set of optimum parameters, including an optimum value for the water of hydration, an average deviation of about 2-3% was obtained between predicted and experimental results. Has 44 references.

R202959 68A

Wills, George B

MULTICOMPONENT MASS TRANSPORT IN AQUEOUS AND MEMBRANE SYSTEMS

Water Resources Res Center, Virginia Polytechnic Inst Bulletin 11, Jan 1968. 31 p, 5 fig, 4 tab, 44 ref, disc

Virginia Polytechnic Institute, Blacksburg

DESCRIPTORS./ *mass transfer/ *diffusion/ osmosis/ electrodialysis/ bibliographies/ *membranes/ electrochemistry/ demineralization/ *ion transport/ liquids/ electrolytes/ *membrane processes/ desalination/ *aqueous solutions/ dialysis/ mathematical models

IDENTIFIERS --

R202965X67A AIR BUBBLES IN DILUTE AQUEOUS SOLUTIONS
The effects of small quantities of some organic compounds on the size of the air bubbles, the interfacial area, and the oxygen mass transfer coefficient were studied. The substances used were members of the homologous series of mono- and dicarboxylic acids and alcohols. Aloxite plate was used as the gas disperser. The results showed a profound effect of these compounds and a dependence of the effect on the length of the carbon chain of each member of the series. A possible explanation of this effect and its practical importance are discussed. This investigation was supported by Public Health Service (now Federal Water Pollution Control Administration) Grant WP-00562-01Al. Has 24 references.

R202965X67A

Zieminski, Stefan A; Caron, Maurice M; Blackmore, Robert B

BEHAVIOR OF AIR BUBBLES IN DILUTE AQUEOUS SOLUTIONS

IMBC Fundamentals, Vol 6, No 2, pp 233-242, May 1967. 10 p, 22 fig, 24 ref, disc

University of Maine, Orono

DESCRIPTORS.../ *bubbles/ *mass transfer/ *aeration/ measurement/ acids/ alcohols/ bibliographies/ *aqueous solutions/ air-water interfaces/ organic compounds

IDENTIFIERS -/ *air bubbles/ *mass transfer coefficient

CIVIL ENGINEERING (GENERAL)

R202935X68A IMPACT OF COMPUTERS ON SURVEYING METHODS New procedures in field surveying have been developed to utilize the speed and power of the electronic computer. Computer usage reveals an important impact on surveying field methods and computation procedures. Problem-oriented computer programs have played an important part in this effect. The program provides flexible computer graphics capabilities enabling an engineer to use the computer as an aid in executing a survey beginning with the collection and use of record data to a completed map of the survey. This could include: (1) conversion of units of measurement, (2) a computer-plotted record map, (3) reduction of field data, (4) survey adjustments, (5) computations, and (6) a computer-plotted map of results of the survey. An example is given showing how 1 firm's entire survey operations have been influenced and aided by the electronic computer. MIT has developed the Integrated Civil Engineering System (ICES) for 3rd-generation computer systems. This system integrates all facets of a project from planning through design and contruction.

R202935X68A

Montgomery, Clarence J

IMPACT OF COMPUTERS ON SURVEYING METHODS

Proc Amer Soc Civil Eng, J Surveying Mapping Div, Vol 94, No SUl, pp 25-36, Jan 1968. 12 p, 8 fig, 2 tab, 3 ref

Getty Oil Company, Houston, Tex

DESCRIPTORS--/ *surveying/ *computers/ programs/ data collection systems/ *data processing systems/ data reduction/ topographic surveys/ planning/ civil engineering/ topographic mapping/ *computer programming

IDENTIFIERS.-/ computer capability/ problem-oriented languages/ ICES

R202945X68A BRIDGE ANALYSIS--ORTHOTROPIC PLATE THEORY
Two analytical methods are presented for use in bridge analysis. The inclusion of the orthotropic plate theory permits consideration of any type of deck configuration. Structural continuity between all supporting members and their flexibilities may be considered. Computer programs have been developed to apply these techniques. One method, slope deflections, uses the IBM 1620; the other technique, finite differences, uses the IBM 7094. All of the developed equations have been applied to problems consisting of isotropic plates. Complete agreement from both methods and previously analyzed structures occurred for these test cases. An example orthotropic bridge structure was initially designed and then analyzed, when subjected to a truck loading. The resulting deflection and moment data throughout the structure were obtained by both analytical methods. These data are compared, resulting in excellent agreement between methods.

R202945X68A

Heins, Conrad P Jr and Looney, Charles T G

BRIDGE ANALYSIS USING ORTHOTROPIC PLATE THEORY

Proc Amer Soc Civil Eng, J Struct Div, Vol 94, No ST2, pp 565-592, Feb 1968. 28 p, 24 fig, 12 ref, append

University of Maryland, College Park

DESCRIPTORS.../ *bridge design/ *bridges/ analysis/ computer programming/ *structural analysis/ structural behavior/ *elasticity/ plates/ torque/ elastic deformation/ finite differences/ Fourier analysis/ deflection/ plate girders/ structural engineering/ moments/ beams/ loads

IDENTIFIERS-- / finite difference method/ comparative studies/ bridge decks/ *orthotropic bridges/ slope deflection method

CIVIL ENGINEERING (GENERAL)

R202990 68A BURIED ASPHALT MEMBRANE CANAL LINING Analysis of test results and visual observations on membrane samples after 14 yr service revealed no serious deficiencies in asphalt membrane lining. Of the 112 samples evaluated from 20 different canal installations, more than 80% demonstrated satisfactory resistance to field aging. Membranes in poor condition resulted from accelerated aging primarily due to defective construction practices. Test results indicated that thickness is one of the more important factors contributing to life of the asphalt membrane. A minimum thickness of 0.20 in., approximately 1.25 gal/sq yd, is required for longtime service. For a majority of the membranes evaluated, the change in physical properties due to field aging did not materially affect the ability to provide a flexible, watertight lining. Tests indicated that the greatest portion of this change occurs during the first 6 yr; after this period the rate of change decreases. An aging index was calculated through a computer program to determine the relative change in physical properties of the membrane. This study reaffirms that adequate seepage control will be maintained for many years if the membrane is installed according to current Bureau of Reclamation specifications.

R202990 68A

Geier, Fred H and Morrison, William R

BURIED ASPHALT MEMBRANE CANAL LINING

Water Resources Tech Publication, Res Rep 12, 1968. 49 p, 35 fig, 21 tab, 8 ref, 4 append

Bureau of Reclamation, Denver, Colo

DESCRIPTORS.-/ laboratory tests/ asphalt/ asphalt cement/ bituminous materials/ *buried membranes/ *canal linings/ ductility/ flexible linings/ *impervious linings/ impervious membranes/ *lower cost canal linings/ materials testing/ seepage losses/ spraying/ field tests/ ponding tests/ weathering/ computer programming/ aging

IDENTIFIERS.-/ *catalytically blown asphalt/ FORTRAN/ *asphalt membranes

R203000 66A CONCRETE FOR KRASNOIARSK DAM Quality control field testing of aggregate, cement, and concrete at Krasnoiarsk Dam, USSR, indicated as of September 1964, that: (1) washed sands and gravel met specifications, except for larger fractions where a second sorting at the concrete plant was recommended; (2) cement was satisfactory regarding mineral composition, heat generation, and strength; (3) concrete control specimens and cores drilled from mass concrete of the dam were within specification limits for strength and water permeability; and (4) temperature control for concrete at time of placement was not acceptable for summertime. However, since the first mass concrete placement (1961), many problems were faced and changes made in procedures, equipment, and organization in the aggregate processing plants, the Krasnoiarsk Cement Plant, and the 2 mixing plants. A fully automated continuous-flow concrete mixing plant is used for portland cement and slag-portland cement concretes, and a 3-section batching plant is used for special types or batches of concrete. Problems concerning automated equipment, temperature control, supply, and construction site organization are discussed. Figures show layout for continuous-flow mix plant, zoning of dam for types of concretes, cement chemical composition, and test results.

R203000 66A

Ginzburg, Ts G; Zinchenko, N A; Skvortsova G F

CONCRETE FOR KRASNOIARSK DAM

Gidrotekh Stroit, No 2, pp 6-12, 1966. Transl from Russ, Bur Reclam Transl 676, Oct 1966, 35 p, 12 fig, 5 tab

DESCRIPTORS.—/ *mass concrete/ *concrete technology/ batching/ slags/
concrete control/ concrete mixes/ *concrete plants/ concrete placing/
*concrete dams/ aggregates/ gradation/ conveyors/ automatic/ quality
control/ portland cement/ permeability/ concrete testing/ cold weather
operations
IDENTIFIERS.—/ USSR/ frost resistance/ Krasnoiarsk Dam, USSR/ crack
control/ slag cement

CONCRETE

CONSTRUCTION

R202998 68A TUNNELING WITH CAVITATION FROM WATER JETS Enormous destructive forces produced by cavitation in flowing liquids under optimum conditions have been a great problem to designers of hydrodynamic systems. These destructive forces can be utilized to drill effectively through rock at rates increased to meet modern requirements in tunneling and mining operations. In a test facility capable of producing cavitating jets at 500-fps velocity, intensities of 300 W/M squared have been produced. Erosion strength of some typical rocks has been determined and the best configuration that produces maximum intensity of erosion is indicated. Erosive power of the jet is directly proportional to the power of the jet. Effects of other parameters are presented including exposure time and distance between the nozzle and eroded piece. Much of the success of the method depends upon the nozzle inserts producing cavitation. Two configurations of inserts show promise; 1 is a straight pin acting as a blunt body producing a cavity at its trailing wake, and the other is a turning vane that produces a vortex cavity at the core of the jet. Although the findings are encouraging, further engineering studies are required to optimize the design parameters.

R202998 68A

Johnson, V E Jr; Thiruvengadam, A; Kohl, R E

ROCK TUNNELING WITH HIGH-SPEED WATER JETS UTILIZING CAVITATION DAMAGE

Amer Soc Mech Eng Publication 68-FE-42, 1968. 6 p, 12 fig, 1 tab, 13 ref

Hydronautics, Inc, Laurel, Md

DESCRIPTORS.-/ *tunneling/ tunneling machines/ tunnels/ laboratory tests/
tunnel construction/ *cavitation/ *rock excavation/ erosion/ compressive
strength/ *jets/ mining/ test procedures/ *nozzles/ rocks/ drilling

IDENTIFIERS-- / cavitation control / *cavitation machine / *jet piercing

DAMS AND HYDRAULIC STRUCTURES

R202958 68A STRUCTURAL BEHAVIOR OF TUNNEL LINERS Strain and pressure meters were installed on tunnel liners near the portals of 2 pressure tunnels during construction of the Spring Creek power conduit. Purpose of the installation was to obtain structural behavior measurements for information on the amount of total static head resisted by steel liners. Three strain meters and 2 pressure meters were installed at 6 tunnel stations. Installation of these meters and interpretation of test results are discussed. Measurements were made over a 5-year period. Results indicated one-fifth of the total head was resisted by the liners and permanent stress changes were not produced in the liners from backfill grouting. Exterior surfaces of some liners were subjected to hydrostatic pressures produced by ground water or by water leaking from the conduit. Measurements taken after placing backfill concrete showed that compressive stresses developed in the liner before the conduit was filled. Additional measurements will be required before an explanation can be given for the conditions producing initial compressive stresses in the liner.

R202958 68A

Rouse, George C

STRUCTURAL BEHAVIOR MEASUREMENTS OF TUNNEL LINERS, SPRING CREEK POWER CONDUIT

Bur Reclam Dams Br Rep No DD-6, Jan 1968. 44 p, 18 fig, 1 photo, 1 tab,

Bureau of Reclamation, Denver, Colorado

DESCRIPTORS.../ *structural behavior/ *tunnel linings/ tunnels/ hydrostatic pressures/ *pressure conduits/ *penstocks/ strain gages/ pressure gages/ pressure measuring equip/ strain measurement/ *pressure tunnels/ stress/ instrumentation/ field tests/ steel linings/ *tunnel pressures/ tunnel design

IDENTIFIERS./ Spring Crk Powerplant Calif/ Carlson strain meter/ tunnel supports

DAMS AND HYDRAULIC STRUCTURES

R202984 68A UPPER RESERVOIR--SENECA PUMPED-STORAGE
The 380-mw Seneca Pumped-Storage Plant is under construction in northwestern Pa as part of the Kinzua Project. This facility is being installed adjacent to the Kinzua Dam, a Corps of Engineers' project, on
the Allegheny River 200 miles upstream from Pittsburgh. The upper
reservoir is 800 ft above the river, will have live storage of 6,400
ac ft, and will be lined fully with asphaltic concrete. Detail geology
is given and reservoir designs and lining considerations are reviewed.
Information gained during reservoir construction lead to several major
design changes. A review is given of European experiences in using
asphaltic concrete for impervious linings. European plants visited
during study included Geesthacht on the Elbe River near Hamburg,
Germany; Erzhausen on the Leine River near Hannover, Germany; and
Vianden on the Our River on the German-Luxembourg border.

R202984 68A

Jones, J C and Kleiner, D E

THE UPPER RESERVOIR FOR THE SENECA PUMPED-STORAGE PLANT

Pap, Conf Recent Develop Design Constr Earth Rockfill Dams, Univ California, Berkeley, March 1968. 34 p, 12 fig, 1 tab, append

Harza Engineering Co, Chicago, Ill

DESCRIPTORS. / *pumped storage/ electric power production/ *reservoirs/ geology/ design/ *impervious linings/ asphaltic concrete/ construction/ foreign construction/ silty loams/ foundations/ economics/ dikes/ earth dams/ instrumentation

IDENTIFIERS -- / Pennsylvania/ Kinzua Project, Pa/ Germany/ Vianden
Pumped-Storage Proj/ Geesthacht Power Station/ Erzhausen Plant, Germany

R202985 68A MEASURING PERFORMANCE OF DAMS This paper reviews various methods used to interpret data obtained from instrumentation of an embankment. A case history, El Infiernillo Dam, Mexico, is presented showing how various methods of interpretation provided some insight into the significant influence of load transfer on behavior of a major dam. Emphasis is placed on data obtained from instruments that measure movements or displacements, such as surface reference monuments, crossarms, and inclinometers. Surface reference monuments are installed primarily to measure settlement; however, longitudinal strains can be calculated if the change in distance between any 2 monuments in the same line is measured. Measurement of movement of a monument in more than 1 direction allows vectors of movement to be drawn. Conclusions that may be drawn from studies of various types of measurements are discussed. The load transfer concept and its occurrence and effect on the El Infiernillo Dam are discussed.

R202985 68A

Squier, L Radley

INSTRUMENTATION AND MEASUREMENTS OF PERFORMANCE OF DAMS

Pap, Conf Recent Develop Design Constr Earth Rockfill Dams, Univ California, Berkeley, Mar 1968. 33 p, 17 fig, 4 ref

Shannon and Wilson, Inc, Portland, Oreg

DESCRIPTORS../ *earth dams/ *embankments/ movements/ *instrumentation/ deflection/ settlement/ dams/ inclinometers/ strain/ rockfill dams/ consolidation/ shear stress/ pore pressures/ field tests

IDENTIFIERS .. / *El Infiernillo Dam, Mexico

DAMS AND HYDRAULIC STRUCTURES R202986 68A CONDUITS AND STRUCTURES AT DAMS Appurtenant conduits and structures such as outlet works and spillways constituted 50% of the defects disclosed by California's 5-yr surveil-lance program of water storage facilities. This paper discusses the remedial work to correct these defects and recommends some precautionary measures to avoid such defects. The 1963 Baldwin Hills disaster demonstrated that a possible hazard is created by placing rigid structures on yielding foundations. Some method for accommodating movement should be provided where conduits cross faults, shear zones, or yielding foundations. One way to accomplish this for a buried pipe is to leave an annular air space between the pipe and its encasement. Another potential trouble source is placing a conduit on a combined fill and rock foundation. Cutoff collars are used occasionally around conduits to prevent piping, but their use warrants careful attention. Techniques used in constructing conduits are examined, and some of the more common materials used are listed and discussed. Problems at reservoir appurtenant facilities can be prevented or solved by using the simple principles discussed in this paper.

R202986 68A

Jansen, Robert B

CONDUITS AND STRUCTURES AT DAMS

Pap, Conf Recent Develop Design Constr Earth Rockfill Dams, Univ California, Berkeley, Mar 1968. 15 p

California State Department of Water Resources, Sacramento

DESCRIPTORS../ *conduits/ *earth dams/ *outlet works/ outlets/ collars/ *hydraulic conduits/ hydraulic structures/ *spillways/ foundations/ dam failures/ shear planes/ faults (geology)/ embankments/ cutoffs/ seepage/ underdrains/ safety/ pipes/ *differential displacements/ dams/ differential settlement/ tunneling/ dam foundations

IDENTIFIERS-/ California Dept Water Res/ dam stability

DEMINERALIZATION

R202970 67A REVERSE OSMOSIS DESALINATION

The object of the present work is to present an analysis of the performance of a tubular reverse osmosis duct without the unrealistic assumption of constant water flux and taking into account the case of the developing velocity profile. A mathematical analysis, based on boundary layer theory, is presented for the case of a tubular reverse osmosis duct whose walls are made of a semipermeable membrane. The analysis considers the simultaneous development of velocity and concentration profiles. The momentum and diffusion equations, coupled through both the boundary conditions and the conventive terms in the diffusion equation, are solved by the integral method which also takes into account the nonlinear effects created by the varying water flux produced. Typical results are presented for the concentration buildup at the membrane wall, the flux of water produced and the productive capacity of the system. Since the concentration profile at any value of Z is given as a simple polynomial, the results can be used to study the relaxation of concentration polarization as a Graetz type of problem. Federal Water Pollution Control Administration Grant WP-00968-01A1.

R202970 67A

Srinivasan, S and Tien, Chi

REVERSE OSMOSIS DESALINATION IN TUBULAR MEMBRANE DUCT

Pap, Second Europe Symp Fresh Water From Sea, Athens, Greece, May 1967. 24 p, 6 fig, 2 tab, 10 ref, disc

Syracuse University, N Y

DESCRIPTORS... / laminar flow/ mathematical analysis/ *demineralization/ membranes/ *reverse osmosis/ *semipermeable membranes/ boundary layers/ *analytical techniques

IDENTIFIERS.-/ *tubular reverse osmosis duct/ velocity profiles/ *tubular membrane duct

R202936X68A AQUIFER CHARACTERISTICS AND WELL FLOW
Ground water is the second largest source of fresh water, and increased extraction has resulted in overdrafts in many parts of the world. Accurate knowledge of storage coefficients and hydraulic conductivities is imperative for planning projects involving the underground flow of water. Procedures are presented to determine these coefficients by measuring the discharge from a single well under constant drawdown pumping conditions without recourse to an observation well. Derivation and solution of the basic differential equation of flow in an unconfined aquifer, initial and boundary conditions, and calculation of the average rate and the accumulative volume of flow from a pumped well are explained. Numerographical solutions are developed for determining unconfined aquifer characteristics and unsteady flow through injection wells under constant drawdown or injection pressure conditions. Bas 25 references.

R202936X68A

Esmaili, Houshang and Scott, Verne H

UNCONFINED AQUIFER CHARACTERISTICS AND WELL FLOW

Proc Amer Soc Civil Eng, J Irrig Drainage Div, Vol 94, No IR1, pp 115-136, Mar 1968. 22 p, 6 fig, 3 tab, 25 ref, 2 append

Engineering-Science, Inc, Oakland, Calif; University of California,

DESCRIPTORS.../ *aquifers/ *ground water/ *groundwater recharge/ *wells/ hydraulic conductivity/ recharge wells/ bibliographies/ unsteady flow/ characteristics/ permeability/ drawdown/ injection/ underground water storage

IDENTIFIERS.. / *injection wells/ *artificial recharge/ *artificial replenishment/ come of depression/ storage coefficients

R202956 68A AOUIFER SWEETENING

Aquifer sweetening was studied using a rectangular, glass-walled, sandfilled tank. Two types of aquifers were studied: (1) a 1:40 scale, twopart aquifer (coarse and fine sand) representing a vertical cross section through an idealized portion of an irrigated valley; and (2) a fine sand, single-part aquifer used to evaluate a formula derived from the Ghyben-Herzberg principle for computing depth to a saline-fresh water interface. Salt water was flushed from the aquifers into subsurface drains by applying fresh water to the surface. Test results for both aquifer types showed that tile drains placed near the ground surface will not intercept and discharge surface-applied fresh water if all or part of the aquifer contains salt water. The fresh water displaces the salt water without appreciable mixing and moves it into the drains forming a stable fresh water-salt water interface. Reducing the spacing of drains reduces the amount of salt water that will be removed from the aquifer. The aquifers were charged with salt water having sodium chloride concentrations of 4,000 to 79,770 ppm and colored blue for visual identification. Progress of the tests was recorded in still- and timedsequence motion pictures.

R202956 68A

Carlson, Enos J

REMOVAL OF SALINE WATER FROM AQUIFERS

Bur Reclam Res Rep No 13, 1968. 42 p, 49 fig, 2 tab, 11 ref

Bureau of Reclamation, Denver, Colorado

DESCRIPTORS../ *hydraulic models/ model tests/ drainage/ groundwater flow/ water table/ fresh water/ permeability/ saline water/ fluid flow/ dyes/ tracers/ *ground water/ hydrostatic pressures/ flow nets/ *subsurface drains/ tile drains/ *aquifers

IDENTIFIERS-/ two-part aquifers/ single-part aquifers/ flow rate/ saline ground water/ Ghyben-Herzberg principle/ saline-nonsaline interfaces

DRAINAGE AND GROUND WATER

R202961 68A DISPERSION OF CONTAMINANT IN GROUND WATER The coefficient of transverse dispersion has been determined experimentally with the Reynolds number between 0.3 and 380. It is found that inertial forces are important and the flow pattern of the contaminant varies with the Reynolds number even in a flow obeying Darcy's law. Empirical formulas for the coefficient of dispersion are suggested. Solutions have been obtained for dispersion of contaminant for a line source and from a point source in a nonuniform flow of ground water. Variations of soil properties and velocity along the flow modify the maximum concentration at each cross section, while transverse variation of velocity causes a lateral shift of the trail of contaminant, and destroys the symmetry of concentration distribution at a cross section. Contamination of a well by dispersion is used as an example of application. Effects of gravity and differences in density and viscosity on dispersion at the interface of 2 miscible fluids have been studied and these effects are usually negligible. This conclusion has been verified experimentally. Solutions have been obtained for dispersion at the interface of 2 fluids in 2-dimensional flow. These solutions are found to be valid for dispersion at the interface of 2 fluids in 3-dimensional flow. Has 18 references.

R202961 68A

Li, Wen-Hsiung

TRANSVERSE DISPERSION OF CONTAMINANT IN GROUND WATER: FINAL REPORT

Department Civil Eng, Syracuse Univ, Jan 1968. 53 p, 20 fig, 18 ref, append

Syracuse University, N Y

DESCRIPTORS.-/ permeability/ *dispersion/ flow/ hydraulics/ *diffusion/ *ground water/ *wastes/ Reynolds number/ velocity/ soil physical properties/ testing/ porous media/ soil properties/ Darcys law/ interfaces/ bibliographies

IDENTIFIERS-/ flow patterns

R202997 67A OPTIMUM DEPTH FOR DRAINAGE TILE IN CLAYS Principal factors determining the selection of drainage line depth are: (1) the filtering capacity of soils, (2) the depth of soil freezing and course of thawing, (3) purpose for reclaiming the land, (4) the critical calculated period for removing ground waters. This paper examines the necessary depth for drains in clayey loam and clayey soil. The filtering capacity of soils being drained fluctuates substantially in time and space, with the least amplitude in fluctuation being observed for sandy soils, and the greatest for clayey loam and clayey soil. Clayey soils have a high shrinkage factor and upon drying exhibit a branching network of large and small cracks. In this state these soils are more water-penetrable than sandy loams. With excessive moistening, clayey soils swell, the cracks close gradually, and water permeability decreases greatly. The depth for placing a drain under ground water conditions must be established in each case, taking into consideration the stratification and location of ground water flow. Deepening the drainage systems will result in deepening the open collectors and increasing the cost.

R202997 67A

Krivonosov, I M

DRAINAGE LINE DEPTH

Gidrotekhnika i Melioratsiia, Vol 18, No 6, pp 44-51, 1966. Transl from Russ, Joint Publications Res Serv Transl 685, Oct 1967. 11 p, 5 fig, 1 tab, 11 ref

DESCRIPTORS.../ *drainage systems/ drain tiles/ drainage costs/ *cround water/ tile drains/ *clays/ expansive soils/ frozen soils/ impervious soils/ pervious soils/ percolation/ deep percolation/ permeability/ ice/ capillarity/ field tests/ land reclamation/ swamps/ freezing/ drainage

IDENTIFIERS-- / USSR/ foreign research/ *drains/ root systems

R202951X68A HARMONIC OVERVOLTAGES ON LARGE GENERATORS
Overvoltages, caused from harmonics generated during unbalanced faults
on transmission lines charged by hydromachines, were studied with digital techniques. Results apply to Grand Coulee Third Powerplant for 615—
mva generators and 500-kv lines, but are of a general nature. Influences of generator rotor losses, saturation and related parameters,
transformer and line impedances, and fault phase angles were investigated. Harmonic overvoltage is primarily a function of the generator
saliency ratio and line impedances. Generator saturation and losses reduce overvoltages, but saturation may increase overvoltages of generators with intercooling and large amortisseurs. To keep overvoltages
within 1.5 and 2.5 per unit, the generator should have normal saturation, a saliency ratio between 1.15 and 1.35, and system design should
prevent harmonic resonant line lengths. However, resonance approached
through overspeed of load rejection is not serious. A simplified flow
chart is given for the harmonic overvoltage digital program.

R202951X68A

Fillenberg, R R; Gish, W B; Chen, Mo-Shing; et al

HARMONIC OVERVOLTAGES ON LARGE SYNCHRONOUS MACHINES

Pap, 20th Annu SWestern Inst Elec Electron Eng Conf Exhib, Houston, Tex, Apr 1968. 9 p, 14 fig, 1 tab, 8 ref, 2 append

Bureau of Reclamation, Denver, Colo; University of Texas, Arlington

DESCRIPTORS.../ *electric generators/ transmission lines/ electric power/
losses/ *faults (electrical)/ digital computers/ circuits/ excitation/
extra high voltage/ computer programming/ electric currents/ alternating
currents/ power system operations/ saturation/ hydroelectric power/
transmission (electrical)
IDENTIFIERS.../ *harmonics/ *overvoltage/ *synchronous machines/ impedance/

IDENTIFIERS-/ *harmonics/ *overvoltage/ *synchronous machines/ impedance/ load rejection/ reactance

R202952X68A EVALUATING EXCESS CAPACITY IN SUBSTATIONS A common method of improving reliability of a power system substation is the installation of multiple transformer banks acting in parellel to carry the load. Transformer capacities are usually chosen so that one bank can be lost at time of substation peak load without loading remaining banks in excess of their emergency ratings. Such a method of minimizing consumer interruption caused by failure of a single transformer bank is effective but expensive, since more capacity must be installed in the substation than is normally required to carry the load. Two alternatives exist offering prospects for reducing substation capacity and cost, with a small loss in substation reliability. The first is to reduce redundant or spare capacity to an amount less than that required to protect against loss of one transformer at time of peak load. The second involves replacing some of the redundant capacity in a group of substations with capacity in a mobile substation. An analytical method is presented for evaluating service reliability provided by substations with less than full redundancy (firm capacity).

R202952X68A

Patton, A D

A METHOD FOR EVALUATING REDUNDANT CAPACITY IN SUBSTATIONS

Pap, 20th Annu SWestern Inst Elec Electron Eng Conf Exhib, Houston, Tex, Apr 1968. 6 p, 3 fig, 2 tab, 3 ref

Texas A&M University, College Station

DESCRIPTORS... / *substations (electrical) / power transformers / peak loads / costs / capacity reduction / *reliability / power system operations / faults (electrical) / overloads / failure (power) / probability / electric power / economies / electrical equipment

IDENTIFIERS./ outages/ *installed capacity/ mobile substations

ELECTRICAL

R202953X68A TRENDS IN EHV TRANSMISSION DESIGN Transmission engineering and system planning today involve more choices and greater challenges in the development of electric power transmission than at any other period. Availability of higher voltage transmission equipment has increased economical potentials of larger size generating units and extended the horizons of interconnection and regional integration. Reviewing cost comparisons based on trends and experience in design for a variety of conditions can be useful in preliminary consideration for planning of proposed systems. Such comparisons are not readily determined from reviewing the many reports concerning designs applied to particular situations and conditions. This paper reviews trends and makes comparisons to assist in perspective and may oversimplify, rather than explore in depth, the many problems to be studied for future expansion. Developing trends in insulation and clearance requirements and cost comparisons are given for 4 different extra high voltage ratings of transmission line design.

R202953X68A

Sanford, Frank E

TRENDS AND COMPARISONS IN EHV TRANSMISSION DESIGN

Pap, 20th Annu SWestern Inst Elec Electron Eng Conf Exhib, Houston, Tex, Apr 1968. 7 p, 5 fig, 3 tab

Commonwealth Associates, Inc, Jackson, Mich

DESCRIPTORS.../ *extra high voltage/ transmission lines/ systems analysis/ design/ clearances/ *cost comparisons/ electric power/ bus (electrical)/ substations (electrical)/ electrical equipment/ electric insulation/ *transmission (electrical)/ costs/ planning/ right-of-way/ aesthetics

IDENTIFIERS./ *electrical design/ *interconnected systems/ investment/ interties/ electric conductors

R202993X67A ECONOMICS AND RELIABILITY OF BULK POWER The 1965 power failure in Northeastern United States caused a sudden realization of the nation's nearly complete dependence upon electric power and of the value of an uninterrupted supply. The Federal Power Commission has recommended steps to improve the reliability of bulk power supply in the northeast and throughout the United States. These goals can be achieved by 1975 through a concerted effort. Time is needed to strengthen regional transmission networks and interconnections between regions to prevent separation or isolation by major disturbances. Bulk power failures start from human errors, equipment failures, violent storms, or actions of animals. The foundation of reliability is an adequate transmission system. Networks must have a large reserve capability to serve many potential requirements, including some that are unforeseen. Costs of installing improved communications, better system controls, load shedding relays, and emergency power for safe rundown and rapid startup of generation are not insignificant and may amount to millions of dollars. Economic and other benefits resulting from improved reliability are discussed.

R202993X67A

Brown, F Stewart

ECONOMICS OF RELIABILITY OF BULK PONER SUPPLY IN THE UNITED STATES

Inst Elec Eng Conf Publication 34, Part 1 Contrib, pp 150-154, Oct 1967. 5 p

Federal Power Commission, Washington D C

DESCRIPTORS.../ *electric power failures/ electric power/ *disturbances/ transmission (electrical)/ errors/ costs/ control systems/ electric power production/ *reliability/ electrical equipment/ storms/ values/ electrical stability/ economics/ benefits/ losses/ electrical networks

IDENTIFIERS.- / Federal Power Commission/ *load shedding/ recommendations/ *interconnected systems/ interties/ electric utilities/ *outages

ELECTRICAL

R203004 67A OVERVOLTAGES AND FAULTS ON TIMED LINES A transmission line with a half-wave characteristic tuned to the frequency of the power supply, develops direct resonance characteristics leading to exceptionally high overvoltages under short-circuit conditions with linear electrical transmission parameters. This theory is correct only for balanced faults when the fault condition is determined entirely by parameters of the load sequence. Unbalanced faults in normal electrical transmission are distinguished by a large variety of characteristics depending on the type of fault, the faulted conditions, and the parameters of individual sequences, especially neutral sequences. Overvoltages resulting from unbalanced faults are studied. Use of inductive reactance grounding for transformer neutrals and their favorable effect on transmission line overvoltages are discussed. Preliminary data indicate that putting reactive elements into electrical transmission equipment neutrals is most effective for limiting overvoltages by increasing the active component of line impedance of the neutral sequence circuit.

R203004 67A

Ol'shevskii, O V and Samorodov, G I

LIMITATION OF OVERVOLTAGES IN TUNED ELECTRICAL TRANSMISSION LINES WITH SINGLE-PHASE SHORT-CIRCUITS

Izvestiia Sibirskogo Otdel Akadem Nauk SSSR, No 6, pp 9-15, 1964. Transl from Russ, Joint Publications Res Serv Transl 695, Aug 1967, 8 p. 6 fig. 3 ref

DESCRIPTORS.../ *transmission (electrical)/ transmission lines/ power transformers/ *faults (electrical)/ electrical impedance/ resistors/ capacitors/ electric power/ electric potential/ alternating currents/ *resonance/ circuits/ electric currents/ mathematical analysis

IDENTIFIERS.. / *tuned transmission/ *overvoltage/ USSR/ reactance/
foreign research

R202942X68A ESTIMATING ROCK POROSITY FOR GROUTING
The amount of grout injected into a fractured foundation rock depends upon fracture porosity and spacing and sizes of fracture openings.
These properties cannot be measured directly, but may be calculated from borehole water-pressure tests if several simplifying assumptions are made. The method is valid for fractured rock masses of very small intergranular permeability (as compared to fracture permeability) containing no solution cavities or pervious interbeds. Studies of 35 damsites indicated maximum fracture porosities were 0.05% near the surface, decreasing to 0.005% at the 200-ft depth. The volume of grout required for impregnation was correspondingly small. Fracture openings decreased from 100 microns to 50 microns in the same depth interval.
Cement grout was limited to the largest fractures. The minimum spacing of open fractures increased from 4 to 14 ft. All rock types appeared similar in fracture properties. Has 24 references.

R202942X68A

Snow, David T

ROCK FRACTURE SPACINGS, OPENINGS, AND POROSITIES

Proc Amer Soc Civil Eng, J Soil Mech Found Div, Vol 94, No SM1, pp 73-91, Jan 1968. 19 p, 7 fig, 2 tab, 24 ref

Colorado School of Mines, Golden

DESCRIPTORS-/ *foundation investigations/ foundations/ *grouting/ rocks/ fractures/ permeability/ porosity/ engineering geology/ boreholes/ *dam foundations/ *rock foundations/ geologic investigations/ drill holes/ cement grouts

iDENTIFIERS../ rock joints/ grout take/ spacing/ jointed rock/ openings/
geologic defects

FOUNDATIONS

FOUNDATIONS

R202943X68A FOUNDATIONS UNDER DIFFERENTIAL SETTLING A method is presented for foundation design using extrema envelopes of moments, shear forces, reactions, and angular distortions derived by computer calculation of all essential load states and soil properties scatter alternatives. The approach is based on realization that subgrade conditions can never be known in enough detail to justify a calculation based on a single assumption regarding soil properties. Therefore, many probable combinations of subgrade properties scatter and load states should be considered. The method is illustrated on a 4-span beam on single footings, but is applicable to other systems. The procedure consists of: (1) designing footings for uniform maximum allowable settlement under real load; (2) determining load matrices for 16 essential states: (3) determining footing-stiffness matrices for 32 alternate soil modulus extrema under footings; and (4) selecting extrema to be used for drawing envelopes from the total (32 x 16 equal 512) resulting matrices. The computer-based method permits judicious decisionmaking by checking several footing alternatives (for different allowable settlements) with several structural rigidities. Two numerical examples are provided.

R202943X68A

Getzler, Zvi

DESIGN OF FOUNDATIONS UNDER DIFFERENTIAL SETTLING

Proc Amer Soc Civil Eng, J Struct Div, Vol 94, No ST1, pp 53-70, Jan 1968. 18 p, 3 fig, 3 tab, 7 ref, append

Israel Institute of Technology, Haifa

DESCRIPTORS../ *foundations/ design tools/ design/ beams/ footings/ shear forces/ *differential settlement/ probability/ *settlement/ *structural design/ structural engineering/ soil physical properties/ distortion (structural)/ subgrade/ moments/ bearing capacities/ computer programming

iDENTIFIERS. / foundation modulus/ soil-structure interaction/ subgrade modulus/ matrix methods (structural)

R202950X68A CHEMICAL GROUTS

The high unit cost of chemical grouts, as compared with clays and cements, requires a different engineering approach for field use. Techniques have been developed to minimize waste and maximize accuracy of placing the grout at desired locations. These procedures are often opposite to those used with cement grouts. Experienced cement grouters have had difficulty in assimilating the required techniques for using the newer chemical grouts; e.g., the gel time is shorter than the pumping time. Acceptance has increased of all procedures pertinent to chemical grouting as field experience has expanded, and the mechanism of gel formation times studied. A rapidly growing core of knowledge is forming the basis for a new chemical grouting technology.

R202950X63A

Karol, Reuben H

CHEMICAL GROUTING TECHNOLOGY

Proc Amer Soc Civil Eng, J Soil Mech Found Div, Vol 94, No SM1, pp 175-204, Jan 1968. 30 p, 32 fig, 2 tab

American Cyanamid Company, Princeton, N J

DESCRIPTORS... / *grouting/ *grout curtains/ penetration/ groundwater flow/ *chemical grouts/ gels/ *cutoff walls/ impregnation/ seepage/ injection/ construction/ foundations/ dam foundations/ leakage/ costs/ cutoffs

IDENTIFIERS- / barriers/ grout coverage/ grout mixes/ *chemical grouting

FOUNDATIONS

R202987 68A UNDERSEEPAGE CONTROL FOR EARTH DAMS This paper describes and evaluates methods of underseepage control for earth dams. Use of steel sheet piling for a cutoff wall in alluvium has almost disappeared; however, 2 recent developments may revive the use of this piling: a vibrating hammer to drive the piling, and bentonite mud to plug the piling interlock. One advantage of steel sheet piling is speed of installation. Steel sheet piling can be driven by a vibrating hammer for approximately \$0.25/sq ft. There are problems and successes in creating an impervious barrier or curtain in rock foundations by grouting. A new vacuum drill pulls the drill cuttings up through a hollow drill stem, eliminating the problem of sealing the voids adjacent to the drill hole. Special consideration must be taken when grouting soft rock foundations. Advantages of adding bentonite to grout are given. A partial cutoff is proposed for those situations where some seepage can be tolerated. Methods are discussed for estimating the underseepage through a foundation prior to constructing the embankment.

R202987 68A

Sherard, James L

SOME CONSIDERATIONS CONCERNING UNDERSEEPAGE CONTROL FOR EARTH DAMS

Pap, Conf Recent Develop Design Constr Earth Rockfill Dams, Univ California, Berkeley, Mar 1968. 29 p, 2 fig, 13 ref

DESCRIPTORS./ *earth dams/ *dam foundations/ *sheet piling/ seepage/ *underseepage/ *grouting/ grout curtains/ cutoffs/ cutoff walls/ pile driving/ cutoff trenches/ vibrators (mechanical)/ bentonites/ drilling/ drill holes/ cracks/ foundations/ costs/ rock foundations

IDENTIFIERS.. / steel piles/ curtain walls/ seepage control/ reservoir leakage

R202957X67A ROUGHNESS COEFFICIENTS FOR LINED CANALS
A table of values is given of roughness coefficients for lined canals
for hydro plants. Values of n recommended by 4 USSR agencies including
minimum, average, and maximum values are listed. Classes of concrete
lining surfaces include: (1) smooth cement plaster with cement wash;
(2) cast in steel forms with smoothed joints; (3) plastered with mortar
smoothed with wood float; (4) cast in wood forms, not plastered or
smoothed; (5) gunite with smoothing and cement wash; (6) unplastered
surface placed without care; (7) gunite with smoothing but without cement wash; and (8) gunite without smoothing. Stone linings include:
(1) cyclopean masonry in cement mortar; (2) dry stone masonry; (3) cobblestone paving; (4) cobblestone riprap; and (5) broken stone riprap.
Maximum values of n should be used when selecting dike crest levels of
nonself-regulating canals and determining head losses and firm power.
The average value should be used if the design is intended to establish
the average annual loss of energy over a longtime period.

R202957X67A

Vasil'ev, Yu S

DESIGN ROUGHNESS COEFFICIENTS OF LINED CANALS FOR HYDROELECTRIC POWER PLANTS

Hydrotech Constr, No 5, pp 465-467, May 1967. 3 p, 1 tab, 10 ref

DESCRIPTORS--/ *roughness coefficients/ *open channel flow/ *canals/ canal linings/ hydraulics/ head losses/ *flow resistance/ Kutter formula/ foreign design practices/ design criteria/ hydroelectric powerplants

iDENTIFIERS-/ *lined canals/ friction coefficient (hyd)/ Chezy formula/ USSR/ intakes HYDRAULICS

HYDRAULICS

R202973 67A PARTICLE SIZE AND DIFFUSION BY TURBULENCE
Particle diffusion of 6 sizes of nylon particles was observed, recorded, and analyzed. Experimental apparatus was designed and particles were selected to achieve the following: (1) restriction of the particle motion to a horizontal plane thereby eliminating the effect of gravity, (2) elimination of particle-to-particle collisions by observing the motion of widely separated individual particles, (3) elimination of the effect of particle density by using nearly neutrally bouyant particles, and (4) a homogeneous and isotropic field of fluid motion in which particle diffusion occurs without mean motion. Motion of individual particles was recorded on motion picture film, which was subsequently projected for displacement measurements. The particle-displacement data were analyzed using the diffusion theory of continuous movement. Final report to the Federal Water Pollution Control Administration on Grant 5 RO1 WPO0912-02 ESE. Has 19 references.

R202973 67A

Majumdar, Hirendra and Carstens, M R

DIFFUSION OF PARTICLES BY TURBULENCE: EFFECT OF PARTICLE SIZE

Water Resources Center, Georgia Inst Technol Rep WRC-0967, Dec 1967. 102 p, 12 fig, 12 tab, 19 ref

Georgia Institute of Technology, Atlanta

DESCRIPTORS-/ *diffusion/ *particle size/ *turbulence/ bibliographies/ particles/ turbulent flow/ *settling velocity/ instrumentation/ data reduction/ experimental data/ diffusivity

IDENTIFIERS -- / diffusion coefficient

R202996 68A HYPERVELOCITY IMPACT ROCK DISINTEGRATION
Hypervelocity water jets have been investigated intensively, largely in
USSR, for possible application in cutting and breaking rock. Jets of
solid particles from shaped charge explosives and hypervelocity projectiles are of interest because of their penetrating power. Hypervelocity
flow processes involve complex unsteady flow of liquids, solids, and
gases. Appropriate equations of state are required for numerical solutions of equations of motion. Equations of state have been approximated
only for a few material behavior regimes, and little is known about
properties of materials subjected to high dynamic pressures. Solutions
of problems in creating ultra-high pressures and velocities have proved
difficult and much research is required before successful engineering
applications can be made of hypervelocity processes. Has 26 references.

R202996 68A

Clark, G B; Haas, C J; Brown J W; et al

RECENT RESEARCH IN HYPERVELOCITY IMPACT ROCK DISINTEGRATION

Amer Soc Mech Eng Publication, 68-FE-45, 1968. 9 p, 11 fig, 1 tab, 26 ref

University of Missouri, Rolla

DESCRIPTORS./ high pressures/ velocity/ pressure distribution/ impact tests/ impact/ blasts/ shock (mechanics)/ shock waves/ dynamics/ flow/ explosions/ liquids/ gases/ *fluid flow/ *jets/ *supersonic flow/ rock excavation/ rocks/ disintegration/ nozzles/ penetration/ research and development/ hydrodynamics

iDENTIFIERS.../ shaped charges/ *projectiles/ equations of state/ rock breakage/ *high velocity/ *jet piercing/ *hypersonic flow R203001X68A OPTIMIZATION OF PRESSURE CONDUIT SIZES
Various methods of determining pressure conduit sizes are examined.
Although attempts have been made to produce direct solution methods, demonstrating the correctness of the results obtained by such methods is difficult when these methods are applied to different configurations and economic conditions than those under which the methods were developed. The parallel-tangent method is useful and reasonably quick for determining an optimized selection of sizes of different elements of a pressure conduit. This method is less effective if considerable flow at less than full-load conditions occurs, and when I conduit serves multiple pumps. This also applies to the direct-solution method. There is a need for developing adjustment procedures for the parallel-tangent and direct-solution methods to describe moderate load factors effectively. An application of the parallel-tangent method to the case of the pumped-storage scheme pressure conduit is given.

R203001X68A

Barr, D I H

OPTIMISATION OF PRESSURE CONDUIT SIZES

Water Power, Vol 20, No 5, pp 193-196, May 1968. 4 p, 7 fig, 13 ref

University of Strathclyde, Glasgow, Scotland

DESCRIPTORS./ *pressure pipes/ sizes/ *pressure conduits/ head losses/ *penstocks/ *optimum design/ pumped storage/ pressure tunnels/ costs/ pipelines/ foreign design practices/ graphical analysis/ conduits

IDENTIFIERS -- / economic evaluation/ Great Britain/ optimization

R203005 67A RECENT WORK ON DENSITY CURRENTS
The paper reviews recent work on the engineering aspects of density currents or stratified flow. Stratified flow involves the movements of several masses of the same fluid, each mass having a slightly different density but having other physical characteristics approximately identical. The effects of gravity, equilibrium, and interfacial stability are covered. Laboratory model studies on interfacial tension in stratified flow in smooth rectangular channels are summarized, and the problem of extrapolating results to different channel forms is discussed. Practical problems cited included: (1) selective withdrawal, (2) salt wedge intrusion in estuaries, (3) control of salt wedges by air bubble curtains, and (4) mixing of jet discharges. At the present time, many stratified flow problems have not been resolved, but with a good knowledge of theoretical and experimental results the engineer can solve certain problems and determine the order of magnitude for others. Has

R203005 67A

Valembois, J

RECENT WORK ON DENSITY CURRENTS

La Houille Blanche, No 1, pp 15-20, 1965. Transl from French, Bur Reclam Transl 670, Sept 1967. 21 p, 1 fig, 21 ref

DESCRIPTORS.../ density/ *density currents/ *fluid flow/ *stratification/ *fluid mechanics/ diffusion/ reviews/ salinity intrusion/ saline water/ hydraulics/ mixing/ jets/ suspended sediments/ salt water barriers/ estuaries/ bibliographies

IDENTIFIERS.. / foreign research/ France/ *stratified flow/ selective level releases/ interfaces

HYDRAULICS

R203007 67A PIPELINE SURGING WITH STEADY INFLOW Surges of head and discharge were studied experimentally in a laboratory pipe system having check structures spaced equally along the pipe. Surges developed when the downstream portion of the check structures did not flow full. The surges were initiated by releasing air entrained in the downstream leg of the check structures, and were amplified as the flow passed through the successive pipe reaches. The experiments were made of various inflows steady at the upstream end of the system. Plots of surge magnitude against inflow rate showed 2 peaks. One peak resulted from surges initiated by air release through the vent downstream of the check structures; the other peak originated from surges initiated by air release through the downstream leg of the check structure. The nonlinear momentum equation was integrated numerically to predict the growth of the discharge surge from 1 pipe reach to the next. Results were in good agreement with the experiments for different head loss conditions and for pipe reaches with and without surge tanks.

R203007 67A

Holley, E R

SURGING IN A LABORATORY PIPELINE WITH STEADY INFLOW

Bur Relam Lab Rep Hyd-580, Hydraul Br, Sept 1967. 59 p, 20 fig, 3 tab, 7 ref, append

Bureau of Reclamation, Denver, Colo

DESCRIPTORS.../ *pipelines/ *surges/ *water pipes/ *pipes/ hydraulic models/ laboratory tests/ surge tanks/ closed conduit flow/ flow/ air entrainment/ fluid mechanics/ computer programming/ hydraulics/ check structures/ oscillation/ momentum/ fluid flow

IDENTIFIERS. / *pipeline surges/ Runge-Kutta method/ surge waves

HYDROLOGY

R202941 68A SNOWNELT SHORT-TERM DISCHARGE FORECASTING
Snow sensor data are being used advantageously in long-range water supply forecasting and, as sensor networks increase in scope and number, the value of these data will increase. However, application in the area of short-range discharge forecasting is not so apparent. Accuracy of any short-range discharge forecast procedure is basically determined by the snowmelt and surface flow unitgraphs for each particular basin. Consideration must also be given to present limitations in accurately predicting future temperatures and precipitation at high elevations and the great effect these parameters can have on short-range discharge. The most helpful discharge forecast appears to be several flows that express a probability range tailored to the hydrographer's needs.

R202941 68A

Barsch, Ray E and Burnash, Robert J C

FORECASTING SHORT-TERM DISCHARGE FROM SNOWMELT

Pap Western Snow Conf, Stateline, Nev, Apr 1968. 11 p, 5 plate, 2 ref

State Department of Water Resources, Sacramento, Calif; Environmental Science Services Administration, Salt Lake City, Utah

DESCRIPTORS.-/ *snowmelt/ snow surveys/ *runoff forecasting/ *streamflow forecasting/ forecasting/ weather forecasting/ thunderstorms/ sensors/ temperature/ atmospheric precipitation/ hydrology/ moisture content/ water supplies/ errors/ instrumentation/ streamflow

IDENTIFIERS--/ California/ Kings River Watershed Calif/ pressure pillow gages/ pillows (hydraulic)

R202968 67A TRANSVERSAL DRIFTS IN BOTTOM PROFILE The study of transversal drifts in bottom profiles is to be conducted as a field experiment. The specific site for the experiments is Fernandina Beach, on the northeastern coast of Florida. Changes in the transversal profile can be attributed to both transversal and longshore movement of sand. The primary mechanism of littoral processes are the waves impinging on the coast. The waves induce water particle motion which in turn induces sediment movement. Thus, to fully understand littoral processes it is important to measure both sediment transport and physical parameters responsible for such transport. The quality of measurements obtained in the field is largely dependent on the measuring devices or instrumentation employed and considerable emphasis has been placed on measuring the physical environment. The measuring system that has evolved is one of the best systems for measuring the littoral zone anywhere in the world. Results obtained demonstrate the realiability and accuracy of the measuring system. The information that is being collected is unique. It is the first time that a direct correlation between the water particle velocities, waves, and other physical parameters and the sediment transport measured has been obtained in the field.

R202968 67A

Dean, Robert G and Thornton, Edward B

TRANSVERSAL DRIFTS IN BOTTOM PROFILES--PROGRESS REPORT

Federal Water Pollut Contr Admin Rep, Washington, DC, Sept 1967. 40 p, 16 fig, 5 ref

University of Florida, Gainesville

R202992 67A PIPE WRAPS AND COATINGS

DESCRIPTORS--/ *littoral drift/ *sediment transport/ instrumentation/
anemometers/ shores/ *beach erosion/ beach sands/ waves/ current
meters/ piers/ sand traps/ measuring instruments/ bed load/ *littoral/
waves (water)/ pressure measuring instruments/ ocean currents/ profiles/
*bottom sediments

IDENTIFIESS.../ water particle velocities/ wave measurements/ surf zone/

IDENTIFIERS../ water particle velocities/ wave measurements/ surf zone/ Fernandina Beach, Florida/ wave height

Protective coatings and wrapping materials for the exterior of steel pipes were tested in the laboratory. Complete results are reported from investigations started in 1951. Fifty-eight materials were evaluated for resistance to stresses developed by wetting and drying of clay soils and to puncturing from hard clods and rocks. Exposure

of clay soils and to puncturing from hard clods and rocks. Exposure conditions were simulated by the soil stress test, subjecting specimens buried in a clay soil to wetting and drying conditions. Resistance to puncturing was measured by an indentation test. Fifteen protective coating systems offered good resistance to soil stresses and indentation.

R202992 67A

Uyeda, H K

PERFORMANCE OF PIPE COATINGS AND WRAPS IN LABORATORY SOIL TEST

Bur Reclam Lab Rep ChE-64, Chem Eng Br, Nov 1967. 76 p, 62 fig, 3 tab, 3 ref, append

Bureau of Reclamation, Denver, Colo

DESCRIPTORS-/ coal tar coatings/ *coatings/ *protective coatings/ test procedures/ exposure/ glass fibers/ *wetting and drying tests/ tapes/ polyethylenes/ laboratory tests/ shrinkage/ *steel pipes/ corrosion control/ clays/ environmental tests/ backfills/ materials testing/ pipes/ pipelines | IDENTIFIERS--/ *pipe wrappings/ punctures/ *buried pipes/ holidays

(coatings) / product evaluation

MATERIALS ENGINEERING

MATERIALS ENGINEERING

R203003X68A LARGE BORE HD POLYETHYLENE PIPE The almost universal acceptance in Britain of plastic pipe as a major material for handling water, waste, and chemicals has resulted in rapidly increasing production by a few large manufacturers and a big investment in research and development. The development in Finland of seamless extruded high-density polyethylene pipe with diameters up to 48 in. increases the opportunities for using plastic pipe. With an established service history, there are now few instances where technical suitability will be questioned, and plastic pipe may be considered for sites with extremely corrosive conditions, difficult laying conditions, or when flexibility is an advantage. The usual criterion of choice is the cost of installed pipe, compared with other materials. High-density polyethylene appears economical for very large size pipe when considering manufacturing advantages and favorable characteristics. compared to available alternatives in traditional pipe materials. Resistance to chemicals and corrosion, calculation of wall thickness, joining methods, and underwater crossings are discussed.

R203003X68A

Aron, H

LARGE BORE HD POLYETHYLENE PIPE

Pipes Pipelines Int, Vol XIII, No 4, pp 39-42, Apr 1968. 4 p, 4 photo

Plastic Constructions Ltd, Birmingham, Great Britain

DESCRIPTORS./ *pipelines/ *pipes/ *water pipes/ pressure pipes/ conduits/ pressure conduits/ plastic tubing/ *polyethylenes/ plastics/ physical properties/ plumbing/ thickness/ corrosion/ flexible tubing/ materials/ flexibility/ chemical stability

IDENTIFIERS. / polyvinyl chloride/ *plastic pipes/ corrosion resistance/ foreign products/ chemical resistance/ pipe laying/ pipe joints

MECHANICAL ENGINEERING

R202999X68A HYDROGENERATOR THRUST BEARINGS
Hydrogenerators with vertical shafts must have a thrust bearing capable of carrying the weight of the generator rotor and the thrust external to the generator. This external load consists of the weight of the turbine runner and shaft and the downward thrust of water on the projected area of the runner. On a vertical multijet impulse turbine the external thrust consists of only the weight of the turbine shaft and runner. On Francis or propeller turbines there is considerable hydraulic thrust in addition to the weight of the turbine rotating parts. On Francis turbines the total external thrust may equal or exceed the weight of the generator rotor, while on Kaplan or fixed-blade propellor units the thrust may be several times the weight of the generator rotor. The massive forces on modern hydrogenerator thrust bearings make their design, installation, and lubrication extremely critical. Types of thrust bearings capable of supporting these heavy loads and special lubrication methods are discussed.

R202999X68A

Roth, H H

HYDROGENERATOR THRUST BEARINGS

Allis-Chalmers Eng Rev, Vol 33, No 1, pp 25-28, 1968. 4 p, 8 fig, 1 tab

Allis-Chalmers Manufacturing Co, Milwaukee, Wis

DESCRIPTORS.../ *hydraulic turbines/ *electric generators/ lubrication/ *thrust bearings/ high pressures/ Kaplan turbines/ Francis turbines/ loads/ mechanical engineering/ electric insulation/ electric currents/ magnetic fields/ hydroelectric power/ *hydraulic machinery/ weight

IDENTIFIERS. / rotating machines/ machine design

R203006 67A CALCULATING CRITICAL ROTOR SPEEDS A method is presented for calculating critical speeds and constrained vibrations of the rotor of a hydraulic unit, considering the important structural parameters of elasticity of the support, gyroscopic effect of mass settlement, and variable rigidity of the rotor. Design calculations should include these factors for modern, powerful hydraulic units, such as those at the Krasnoiarsk Powerplant in the USSR. The rotor is considered as a vibrating string with 2 or 3 seated masses dividing it into several parts. A. N. Krylov's method of initial parameters can be used for calculating shafts on an elastic foundation and critical speeds of rotors. The method is equivalent to substituting a system of differential equations with constant coefficients representing the different rotor parts for a differential equation with variable coefficients. The solution is written using functions formed by normal fundamental systems. Initial parameters used values for weights, moments of inertia of the mass, and flexibility of the support. Examples of solutions are given and compared with results of calculations for critical speeds without considering these factors. Using electronic computers, the functions can be calculated according to factorization formulas containing 3 to 4 factors.

R203006 67A

Bugov, A U

INCREASING THE ACCURACY OF DESIGN CALCULATIONS FOR CRITICAL SPEEDS OF THE ROTOR OF A HYDRAULIC UNIT BY THE METHOD OF INITIAL PARAMETERS

Energomash, No 11, pp 6-10, 1964. Transl from Russ, Bur Reclam Transl 692, Aug 1967, 18 p, 1 fig, 3 tab, 7 ref

DESCRIPTORS--/ rotation/ rotating components/ turbine runners/ *critical speed/ mathematical analysis/ differential equations/ boundary values/ flexible foundations/ eccentric loading/ moments of inertia/ rigidity/ shafts (machinery)/ *hydraulic turbines/ structural analysis/ machines/ *vibrations/ generators/ structural behavior/ elasticity/ stress IDENTIFIERS-- / stators/ *rotors/ USSR/ *machine design/ gyroscopic effects

R203008 67A TURBINE DEFECTS INCREASE CAVITATION The present manufacturing tolerances used in the USSR turbine building industry are not rigid enough to prevent small deviations in blade shape causing increased cavitation. The author examines mathematically the problem of adding to other cavitation causes the altered shape of the blade profile due to manufacturing defects. He evaluates the changes in the coefficient of cavitation introduced by these defects, and defines the problem as the flow of an ideal noncompressible fluid around a surface differing slightly from plane, and around a nearly circular cylinder. The velocity potential is determined for these 2 problems by the method of the smallest parameter. Special cases used were: (1) deviation of an ideal surface changed according to the sinusoidal law and (2) the deviation appearing as a chance function. Results can be used to examine the problem of flow around real hydraulic turbine blades. Changes in the cavitation coefficient caused by blade shape deviations can reach substantial values, especially in the profile of peripheral sections. Formation of local cavitation pits causes increased erosion and early disruption in power production.

R203008 67A

Aronson, A Ia

EVALUATING THE EFFECT OF ERROR IN BLADE MANUFACTURE ON THE VALUE OF THE COEFFICIENT OF CAVITATION

Energomash, No 8, pp 1-5, 1966. Transl from Russ, Bur Reclam Transl 700, Aug 1967, 16 p, 3 fig, 3 tab, 5 ref

DESCRIPTORS.../ *foreign design practices/ turbines/ *cavitation/ turbine parts/ *turbine blades/ hydraulics/ hydrodynamics/ cylindrical bodies/ tolerances (mechanics)/ manufacturing/ fluid flow/ *hydraulic turbines/ mathematical analysis/ boundary values/ velocity/,model tests/ errors/ velocity distribution/ defects/ geometric shapes/ fabrication IDENTIFIERS.../ USSR/ machine design

OPERATION AND MAINTENANCE

R202995X68A EVALUATING COST OF CONTRACT MAINTENANCE
Little information is available for calculating relative costs of maintenance performed by company employees versus contract crews. Although this problem has generally been viewed as not amenable to objective analysis, a solution is suggested. A plant maintenance force that is either too large or too small causes unnecessary expense. In fact, the penalties for over- or understaffing a company maintenance force are more crucial financially than the difference in pay rates between company and contract forces. The optimum size of a company force can be estimated when some idea of workload fluctuation is given. The method presented determines the optimum plant work force of a contract crew, based on data obtained from 1 plant. A formula is developed and applied to the annual maintenance costs for 3 estimates of contract labor rates based on 1962 and 1963 data and workload distribution.

R202995X68A

Jordan, James H

HOW TO EVALUATE THE ADVANTAGES OF CONTRACT MAINTENANCE

Chem Eng, Vol 75, No 7, pp 124-130, Mar 25, 1968. 4 p, 2 fig, 4 tab, 2 ref

Atlas Chemical Industries, Wilmington, Del

DESCRIPTORS-/ *maintenance/ costs/ work/ *maintenance personnel/ job analysis/ management/ contracting/ economies/ wages/ industrial plants/ analysis/ labor/ probability/ industrial relations/ operation and maintenance

IDENTIFIERS. / optimization/ *cost analysis/ *cost savings/ annual costs

PROJECT PLANNING

R202954X67A HYDROELECTRIC DEVELOPMENT OF THE DNIEPER
The V I Lenin Dnieper Hydroelectric Powerplant, commissioned in 1932,
began the multipurpose hydroelectric development of the Dnieper, the
third largest river in Europe. The 6 hydroelectric complexes provide:
(1) river regulation, (2) flood control, (3) irrigation and industrial
water, (4) electric power, and (5) deepwater transport from the Black
Sea to Kiev. A review is presented of the history and planning of this
large hydroelectric project for development of the Ukrainian USSR water
resources. Kiev Powerplant, the first pumped-storage installation in
the USSR, was also the first to have horizontal capsule turbine units
installed for energy-water-transport purposes and became a prototype for
low head plants on flat rivers. Kakhov Powerplant was the site of several hydroconstruction innovations. Foundation material for concrete
structures at the Kakhov site was a soft soil consisting of fine grained
sands with silty lenses. Has 41 references.

R202954X67A

Baksheev, E A; Dotsenko, T P; Kadomskii, G D

THE DNIEPER RIVER HYDROELECTRIC POWER STATION SEQUENCE

Hydrotech Constr, No 5, pp 406-417, May 1967. 12 p, 9 fig, 41 ref

DESCRIPTORS-/ hydroelectric powerplants/ project planning/ flood control/ irrigation/ *multiple purpose projects/ industrial water/ construction/ bibliographies/ river regulation/ hydroelectric power/ hydraulic fills/ precast concrete/ pumped storage/ foreign projects/ navigation/ dams

IDENTIFIERS--/ USSR/ Ukrainian SSR/ *Dnieper River, USSR/ bulb turbines/ river cascade systems

R202939X68A CRAPHICAL STABILITY ANALYSIS OF SLOPES
The stability of a jointed rock mass is analyzed by graphical projections on a reference hemisphere, using either stereo nets or equal-area nets. The graphical method provides a speedy and practical technique for evaluating the effects of a 3-dimensional planar geologic structure on the stability of a rock slope. The effects of remedial measures can also be evaluated. Elements of hemispheric projection illustrated on equal-area nets and spatial views are: (1) equatorial nets, (2) meridional nets, (3) pole diagrams, (4) great circles, (5) small circles, and (6) friction cones. An example shows the use of these elements in geologic and engineering phases of a slope stability study. Consideration was given to wedge-type slides along 2 planes and block-type movements on 1 plane with the opening of the other plane. Blank forms of the 3 nets are included.

R202939X68A

John, Klaus W

GRAPHICAL STABILITY ANALYSIS OF SLOPES IN JOINTED ROCK

Proc Amer Soc Civil Eng, J Soil Mech Found Div, Vol 94, No SM2, pp 497-526, Mar 1968. 30 p, 13 fig, 2 tab, 12 ref, 2 append

University of Karlsruhe, Germany

DESCRIPTORS../ *graphical analysis/ slopes/ rocks/ sliding/ *stability analysis/ three-dimensional/ *rock mechanics/ engineering geology/ charts/ geometry/ safety factors/ landslides/ shear strength

!DENTIFIERS-- / projection/ *rock slope stability/ joint systems/ rock joints/ projective geometry/ jointed rock/ geologic defects

R202955 68A STABILITY ANALYSIS OF ROCK SLOPES Failure of a rock mass is dictated by the presence of geological surfaces of separation. Equilibrium conditions can be analyzed 3-dimensionally, provided the planes of weakness are known. Forces resulting from water percolation are taken into account. Equilibrium conditions are considered in terms of the various parameters involved, including pore pressures and shear strength. The problem is studied in space geometry and solved using zones and curves on a unit radius sphere. Mapping of the sphere provides practical graphs where weighting of different parameters can be evaluated, and the engineer is able to assess the conditions of equilibrium.

R202955 68A

Londe, Pierre

STABILITY ANALYSIS OF ROCK SLOPES

Continuing Educ Eng Course, University of California, Berkeley, Mar $1968. \quad 48 \text{ p}, \ 22 \text{ fig}$

Coyne and Bellier, Paris, France

DESCRIPTORS.../ *stability analysis/ *rock mechanics/ slopes/ probability/ friction/ rocks/ shear strength/ *transformations/ three-dimensional/ uplift pressures/ earthquakes/ seismic design/ safety factors/ foreign design practices/ pore water pressures/ *graphical analysis

IDENTIFIERS-- / *rock slope stability/ rockslides/ rock joints/ projection/
France

ROCK MECHANICS

R202991 68A RADIAL JACKING TEST FOR ARCH DAMS
Designing arch dams requires knowledge of deformation, creep, and set
properties of abutment and foundation rock. A 30-million-lb radial
jacking test was made in a gallery of an exploratory tunnel driven into
a proposed dam abutment to determine the effects of joints, fractures,
and other weaknesses on the deformation characteristics of the rock
mass. This paper describes the radial test equipment, instrumentation,
and test procedures. A newly developed borehole extensometer was used
to measure rock movements at many positions behind the loaded rock surface. This gage could distinguish between closure of joints and elastic deformations of intact rock. Deformations caused by closure of
joints and fractures were much greater than those caused by elastic
properties of intact rock.

R202991 68A

Wallace, George B; Slebir, Edward J; Anderson, Fred A

RADIAL JACKING TEST FOR ARCH DAMS

Pap, Rock Mech Symp, Univ Texas, Austin, May 1968. 47 p, 24 fig, 6 ref

Bureau of Reclamation, Denver, Colo

DESCRIPTORS.../ *rock mechanics/ arch dams/ *dam foundations/ dam design/ *abutments/ deformation/ instrumentation/ *rock foundations/ boreholes/ extensometers/ creep/ field tests/ test procedures/ *foundation investigations

iDENTIFIERS./ rock properties/ in situ tests/ *radial loads/ flat jack
method/ borehole deformation gage/ jointed rock/ *jacking tests

SANITARY ENGINEERING

R202960 67A PHYSIOLOGICAL ECOLOGY OF ACTIVATED SLUDGE
The overall objectives of this research include: (1) isolation, identification, and propagation of bacteria in activated sludge from a conventional treatment plant, (2) use of these cultures individually and as mixtures in oxygen uptake studies to determine the role of cultures in the metabolism of monocarbocylic acids, and (3) measurement of content of individual fatty acids in aeration tank influent. This investigation was made possible by Research Grant WP-00816 from the Federal Water Pollution Control Administration, Department of the Interior. Has 26 references.

R202960 67A

Cibulka, John J and Malaney, George W

EXPERIMENTAL CONDITIONS IN THE STUDY OF THE PHYSIOLOGICAL ECOLOGY OF ACTIVATED SLUDGE

Pap, 22nd Ind Waste Conf, Purdue Univ, Ind, May 1967. 23 p, 9 fig, 1 tab, 26 ref

Vanderbilt University, Nashville, Tenn

DESCRIPTORS.-/ cultures/ bacteria/ bibliographies/ *sludge/ ecology/ flocculation/ sanitary engineering/ *sewage treatment/ field tests/ oxidation/ aeration/ *activated sludge/ *physiological ecology/ microorganisms

IDENTIFIERS--

R202971 67A ALGAE AND PROTOZOA DISPERSAL BY INSECTS Algae and protozoa of 28 different genera were cultured from external washings of 14 species of aseptically collected adult horse flies and Algae predominated, with 7 genera of blue-greens, 15 of greens, and 1 genus of diatoms; 5 genera of glagellate protozoa were identified in the cultures, although no rhizopods or ciliates were found. Analysis by "t" test showed that the horse flies carried significantly more algae and protozoa than the mosquitoes. Five tabanid species yielded 21 genera; 9 mosquito species of 4 genera yielded 17. Known dispersion distance of some of the diptera studied suggest that the numerous algae and protozoa which they carried could be transported overland from 1 aquatic or moist habitat to another. The data suggest that some diptera contribute substantially to the passive dispersal of large numbers of different algae and protozoa. This study was supported in part by the Federal Water Pollution Control Administration Grant 5 RO1 WP00855-02. Has 28 references.

R202971 67A

Revill, Donald L; Stewart, Kenneth W; Schlichting, Harold E, Jr

DISPERSAL OF VIABLE ALGAE AND PROTOZOA BY HORSE FLIES AND MOSQUITOES (DIPTERA: TABANIDAE, CULICIDAE)

Pap, Ann Entomol Soc America, Vol 60, No 5, pp 1077-1081, Sept 1967. 5 p, 3 tab, 28 ref, disc

North Texas State University, Denton

DESCRIPTORS--/ distribution/ transportation/ *mosquitoes/ *dispersion/ *algae/ bibliographies/ biology/ ecology/ sanitary engineering/ *insects/ *diptera/ ecological distribution/ *protozoa/ *entomology

IDENTIFIERS -- / *horse flies

R202972 68A WATER AND SEWAGE SYSTEMS IN WYOMING
The purpose of this compendium is to present relevant descriptive
information about the characteristics of the municipal water and sewage
systems in Wyoming. This information was obtained by questionnaires
submitted to the state's municipalities. The publication includes
information for each municipality concerning population, number of
residential water connections, number of commercial, industrial, other
water connections, total water supplied to all users during given years,
water permit numbers and their dates, water cost rate schedules by type
of water users, water storage capacity, and type of sewage system.

R202972 68A

Schwer, R Keith

MUNICIPAL WATER AND SEWAGE SYSTEMS IN WYOMING: A SOURCE BOOK OF DATA

Wyoming Water Resources Res Inst, Univ Wyoming, Feb 1968. 124 p

University of Wyoming, Laramie

DESCRIPTORS-/ *municipal water/ *sewerage/ distribution systems/ wells/ water treatment/ water costs/ population/ cities/ municipalities/ water storage/ sewage treatment/ industrial water/ water supply systems/ *data collections/ municipal waste

IDENTIFIERS -- / *Wyoming

SANITARY ENGINEERING

R202978 67A CHLOROPHYLL INHIBITION AND SUPPRESSION This paper describes the inhibition of chlorophyll synthesis in algae due to the presence of selected organic compounds. Emphasis is directed to an explanation of laboratory techniques and an evaluation of oxygen emission. The relative toxicity of 33 phenolic-type compounds and 8 pesticides to chlorella pyrenoidosa were evaluated. Algal cultures were grown in test tubes which were chemostated and under continuous illumination for a test period of 72 hr. The relative toxicity was evaluated by measuring changes in chlorophyll content of the algal suspensions. Under such conditions the decrease in chlorophyll content is generally logarithmic to the concentration of the toxic additive. In the case of phenolic-type compounds, the toxicity is a function of the substitute group and their relative position. The direct manometric technique was employed for the measurement of the photosynthetic gas exchange. Results show that oxygen emission is suppressed by chlorinated and nitrated phenols. Federal Water Pollution Control Administration Continuation Grant WP-00688-03. Has 18 references.

R202978 67A

Huang, Ju-Chang and Gloyna, Earnest F

EFFECTS OF ORGANICS ON PHOTOSYNTHETIC REOXYGENATION--PART I: CHLOROPHYLL INHIBITION AND SUPPRESSION OF PHOTOSYNTHETIC OXYGEN PRODUCTION

Rep, Civil Eng Department, Univ Texas, 1967. 46 p, 28 fig, 3 tab, 18 ref

University of Texas, Austin

DESCRIPTORS-/ *organic compounds/ *algae/ photosynthesis/ pesticides/ toxicity/ insecticides/ herbicides/ sanitary engineering/ inhibition/ *chlorophyll/ *chlorella/ phenolic pesticides/ reaeration/ bibliographies

IDENTIFIERS. / chlorella pyrenoidosa/ phenolic compounds

R202981 67A BEHAVIOR OF SINGLE BUBBLES This report consists of 2 parts. Part 1 deals with methods of measuring rates of volume change of a rising gas bubble, its surface area, velocity of rise, and the instantaneous mass transfer coefficient principle of this method was discussed in Progress Report 2a (1966). However, because of the changes introduced and the reproducibility tests conducted, the method is discussed in this report in detail. Special attention is given to the method of bubble release that proved to be an important factor affecting the consistency of results. Part 2 discusses effects of a homologous series of normal alcohols on mass transfer and drag coefficients of a carbon dioxide bubble. Carbon dioxide was used in the tests instead of air because of its higher solubility in water permitting greater accuracy of results. It may be expected that similar effects would take place in the case of air bubbles and thus help to better understand and possibly improve aeration systems. The study showed the depressing effect of an alcohol on KL increases with its chain length and concentration. A similar consistency of effects was also noticed in the case of drag coefficient which increased with concentration and chain length of the alcohol. Has 55 references.

R202981 67A

Zieminski, Stefan A and Raymond, Delmar R

USE OF CHEMICAL ADDITIVES TO IMPROVE AERATION RATES: STUDY OF THE BEHAVIOR OF SINGLE BUBBLES--PROGRESS REPORT NO 3a

Federal Water Pollut Contr Admin Rep R 848-4, Washington, DC, 1967. 52 p, 19 fig, 55 ref, disc

University of Maine, Orono

DESCRIPTORS.- / *bubbles/ *mass transfer/ gases/ carbon dioxide/ volume/ alcohols/ *aeration/ coefficients/ bibliographies/ drag/ flotation/ high speed photography/ *air entrainment/ bubbling pressures/ size

IDENTIFIERS--

SANITARY ENGINEERING

R202982 67A IMPROVING AERATION RATES WITH CHEMICALS
The investigation presented in this report deals with a method for improving the rates of aeration. In order to achieve this objective, small quantities of some organic substances are introduced in the zone of bubble formation. These additives decrease bubble coalescence and improve the rate of transfer because of the substantial increase in the interfacial surface area. The tests were conducted with n-octanol, 4-methyl-2-pentanol and heptanoic acid. At a concentration of 1 ppm the n-octanol and 4-methyl-2-pentanol showed an improvement in the rate of aeration of 70% over that in pure water. At a concentration of only 0.5 ppm n-octanol gave an improvement in the rate of transfer of 30%. Since the design of the aerator and the agent were not optimized, it may be expected that still better effect could be obtained in a large scale installation. Federal Water Pollution Control Administration Grant WP-00562-04. Has 36 references.

R202982 67A

Zieminski, Stefan A and Lessard, Richard R

USE OF CHEMICAL ADDITIVES TO IMPROVE AERATION RATES: STUDY OF MODELS OF AIR DISPERSERS--PROGRESS REPORT 3b

Federal Water Pollut Contr Admin Rep R 848-4, Washington, DC, 1967. 28 p, 11 fig, 36 ref, disc

University of Maine, Orono

DESCRIPTORS.- / *aeration/ *bubbles/ organic compounds/ mass transfer/ *air entrainment/ dispersion/ alcohols/ surface tension/ *organic matter/ surfactants/ fermentation/ activated sludge/ oxygenation/ bibliographies

IDENTIFIERS ...

R202944X68A FLEXIBLE CULVERTS UNDER HIGH FILLS
The possibility is discussed of predicting load distribution on a culvert if the fill material, base material, and method of fill are specified. The additional feature of culvert deformation as fill material is placed is considered. Equilibrium culvert modes are considered, and no concern is given to buckling. The base, culvert, and hay inclusion may be considered as a system whose vertical stability is influenced by all the parts and the horizontal flexibility by the culvert alone. Pressures on the crown are decreased with reduced vertical stiffness, and those on the wall are increased with reduced horizontal stiffness. This suggests that the effect of isotropic normal pressure may be attained by proper adjustment of the hay and the base characteristics. After a brief review of the existing state of the problem, important analytical additions are developed and employed in the solution of typical problems.

R202944X68A

Brown, Colin B; Green, David R; Pawsey, Stuart

FLEXIBLE CULVERTS UNDER HIGH FILLS

Proc Amer Soc Civil Eng, J Struct Div, Vol 94, No ST4, pp 905-917, Apr 1968. 13 p, 11 fig, 1 tab, 5 ref, 2 append

Columbia University, New York; Glasgow University, Scotland: University of California, Berkeley

DESCRIPTORS.../ *culverts/ *fills/ *embankments/ flexural strength/ stress analysis/ pressure distribution/ computer programming/ deformation/ load distribution/ stress distribution/ loads/ *soil pressures/ pipes/ dead loads/ *earth pressures/ model tests/ settlement/ foundations

IDENTIFIERS./ *flexible culverts/ *flexible pipes/ hay/ organic matter/ finite element method SOILS ENGINEERING

SOILS ENGINEERING

R202948X68A FINITE-ELEMENT METHOD AND SOIL MECHANICS Finite-element methods can be used in solving problems of continuum mechanics where material has linear or nonlinear properties. The finiteelement method is applied to soil mechanics problems, defined either as plane-strain or axially symmetric. Problems have been solved in the linear media of homogeneous, isotropic material and results agreed with closed-form solutions. The finite-element method was extended to nonlinear problems using pseudoelastic constants. These constants were selected so that stress in the finite element for a given strain was the same as stress corresponding to some strain in the continuum. Nonlinear stress-strain relationship was satisfied by an iterative procedure, and nonlinear problems in plane-strain and axially symmetric cases were solved and compared with experimental results. Agreement was observed between the computer solution and experimental results. The finite-element method proved to be a powerful tool for solving problems involving either linear or nonlinear media. Has 15 references.

R202948X68A

Girijavallabhan, Chiyyarath V and Reese, Lymon C

FINITE-ELEMENT METHOD FOR PROBLEMS IN SOIL MECHANICS

Proc Amer Soc Civil Eng, J Soil Mech Found Div, Vol 94, No SM2, pp 473-496, Mar 1968. 24 p, 18 fig, 15 ref, 2 append

Texas Technological College, Lubbock; University of Texas, Austin

DESCRIPTORS.../ strain/ *soil mechanics/ computers/ mechanics/ foundations/ linear systems/ nonlinear systems/ homogeneity/ isotropy/ stress-strain curves/ elastic deformation/ plastic deformation/ elasticity modulus/ stress/ settlement/ stress distribution/ bibliographies/ stress analysis

IDENTIFIERS-/ *finite element method/ plane strain/ stiffness matrix/ shear modulus

R202949X68A EMBANKMENT PORE PRESSURES

Theoretical methods for predicting pore pressures in earth dams are reviewed, and observed pore pressure data from selected dams constructed by the Corps of Engineers (CE) and other agencies are summarized to indicate development and magnitudes of construction pore water pressures in earth dams. Construction characteristics and pore pressure data from 10 CE, 24 USBR, and 9 foreign dams are summarized and compared. The study determined that broad conclusions for all earth dams are difficult to make because of numerous factors influencing pore pressure buildup and that each dam must be treated individually in predicting construction pore pressures. Conclusions from this study are: (1) provisions for internal drainage effectively relieve construction pore pressures in earth embankments; (2) pore pressure ratios in embankment materials increase rapidly as placement water content increases, especially above optimum water content; and (3) pore pressures increase with increasing dam height, but dams less than 100 ft high can experience large pore pressures. Has 56 references.

R202949X68A

Sherman, Walter C and Clough, Gerald W

EMBANKMENT PORE PRESSURES DURING CONSTRUCTION

Proc Amer Soc Civil Eng, J Soil Mech Found Div, Vol 94, No SM2, pp 527-553. 27 p, 11 fig, 4 tab, 56 ref, append

U S Army Engineer Waterways Experiment Station, Vicksburg, Miss; University of Calif, Berkeley

DESCRIPTORS.../ *pore pressures/ pore water pressures/ pore air pressures/
*earth dams/ *embankments/ drawdown/ dams/ bibliographies/ construction/
moisture content/ compaction/ soil classifications/ drainage/ soil
mechanics

IDENTIFIERS.. / stress ratio/ construction methods

STRUCTURAL AND ARCHITECTURAL ENGINEERING

R202946X68A AN INTEGRATED SYSTEM FOR BUILDING DESIGN BUILD is a pilot version of a computer system for research in computeraided building design and a subsystem of the Integrated Civil Engineering System developed at the Massachusetts Institute of Technology. The system provides a problem-oriented language for a limited but integrated description of a building having geometry based on the rectangular parallelepiped and permits the user to: (1) specify a configuration of spaces, (2) indicate the composition of surface materials, (3) generate a structural frame at the edges of the spaces, and (4) make selective takeoffs of areas, volumes, weights, and costs. Geometric and topological data are in a form suitable for subsequent analysis using the Structural Design Language. BUILD is not a practical design system but a tool for studying problems of modeling buildings in computers. Research is directed toward an integrated information base explicitly recording interactions among design data and capable of incremental extension in scope and detail. The current scope of BUILD is illustrated.

R202946X68A

Teague, Lavette C Jr and Hershdorfer, Alan M

BUILD--AN INTEGRATED SYSTEM FOR BUILDING DESIGN

Proc Amer Soc Civil Eng, J Struct Div, Vol 94, No ST4, pp 983-994, Apr 1968. 12 p, 7 fig, 12 ref

Massachusetts Institute of Technology, Cambridge

DESCRIPTORS.../ *buildings/ computer programming/ *structural engineering/ construction costs/ structural analysis/ *structural design/ structural models/ computers/ models/ design/ programs/ programming languages

IDENTIFIERS -- / mathematical models / *BUILD / problem-oriented languages

R202967 68A SOIL MOISTURE EXTRACTION BY SINGLE PLANT A theoretical model was developed to predict the rate of soil moisture extraction by a single plant as a function of various soil and plant parameters. This model treats a plant root as a line sink and the plant as a conduction tube. The soil is assumed to be the controlling factor in transpiration. A laboratory test was performed on mature cotton plants grown in individual pots to determine if the model was valid. To determine the water potential at the plant root interface, which was a parameter of the model, the resistance of the plant to flow was determined. By varying the evaporative demand the plant resistance to flow was measured as a function of the water potential of the plant leaves and the transpiration rate. This determined resistance to flow was then used to determine the water potential at the soil-root interface at later time. The test of the model showed it would not predict the rate of soil moisture extraction for this particular soil-plant system. It is believed that during part of the test period the assumptions underlying the model were not completely met. In particular the soil was assumed to be the controlling factor in transpiration, but at least during periods of low soil moisture tension the plant apparently controlled transpiration. Has 19 references.

R202967 68A

Kenyon, David C and Lambert, Jerry R

PREDICTION OF THE RATE OF SOIL MOISTURE EXTRACTION BY A SINGLE PLANT

Water Resources Res Inst, Clemson Univ Rep 2, Feb 1968. 37 p, 8 fig, 3 tab, 19 ref

Clemson University, South Carolina

DESCRIPTORS... / *soil moisture/ *evapotranspiration/ absorption/ *plant (botany)/ bibliographies/ *soil-water-plant relationships/ root zone/ *moisture uptake/ *transpiration/ *consumptive use/ soil water movement/water loss/ conduction

IDENTIFIERS -- / plant-water physics

33

WATER-PLANT-SOIL RELATIONS

WATER POLLUTION

R202975 66A POLLUTION IN THE LAKE TAHOE BASIN Lake Tahoe is threatened by nitrogen and phosphorus pollutants from sewage discharged within the basin. The phosphorus content of Lake Tahoe water has reached a critical level. Objectionable algal growths are present in near-shore areas where phosphorus concentrations are highest. A substantial increase in nitrogen, common in human wastes, could create obnoxious algae throughout the lake, destroy its clarity and cause a distasteful sight and smell. Lake Tahoe is threatened by silt erosion from lands where the natural vegetative cover is destroyed and soil is disturbed by land clearing. Silt, transported by runoff during the rainy season, reduces water clarity and beauty; destroys aquatic life and adversely changes composition of organisms that may be present. The following general improvements should be made: (1) establish additional public utility districts, and extend public sewer service to collect all sewage from the drainage area; (2) provide minimum secondary treatment for all wastes collected; (3) export all sewage and garbage out of the Lake Tahoe basin; and (4) minimize the transport of silt into Lake Tahoe by using effective soil conservation and erosion control for lands within the basin.

R202975 66A

West, A W and Mackenthun, K M

REPORT ON POLLUTION IN THE LAKE TAHOE BASIN, CALIFORNIA-NEVADA

Federal Water Pollut Contr Admin, July 1966. 55 p, 6 fig, 6 tab, append

Federal Water Pollution Control Administration, Cincinnati, Ohio

DESCRIPTORS.- / *water pollution/ water quality/ water utilization/ waste disposal/ soil erosion/ turbidity/ sewage effluents/ nitrogen/ lakes/ algae/ phosphorus/ *water quality control/ water pollution control/ waste treatment/ waste water disposal/ *eutrophication/ phytoplankton/ Nevada/ California
IDENTIFIERS.-/ *Lake Tahoe

R202977X67A TENDIPES PLUMOSUS IN MINERAL ACID WATER Tendipedid populations from 19 strip-mine lakes of varying pH were analyzed. Tendipes plumosus (Linne) was the sole tendipedid established in water with measurable potential free acidity. In lakes lacking potential free acidity, T. plumosus, when present, was frequently accompanied by other tendipedid species. It is suggested that the distribution of T. plumosus was not restricted by a mineral acid environment, but was related to the presence of leaf litter. This investigation was supported in part by Federal Water Pollution Control Grant WP-00379.

R202977X67A

Harp, George L and Campbell, Robert S

THE DISTRIBUTION OF TENDIPES PLUMOSUS (LINNE) IN MINERAL ACID WATER

Limnology and Oceanography, Vol 12, No 2, pp 260-263, Apr 1967. 4 p 3 tab, 13 ref

University of Missouri, Columbus

DESCRIPTORS./ distribution/ water quality/ *midges/ ecological distribution/ distribution patterns/ *strip mine lakes/ acidic water/ leaves/ coal mines/ *coal mines waste/ acidity

IDENTIFIERS -- / *mineral acid water / leaf litter

R202979 67A REMOVAL OF PESTICIDES FROM WATER

The purpose of this study was to investigate some of the properties of pesticides as they exist in water, and to determine the effectiveness of several water treatment processes in the removal of pesticides from water. Among the pesticides investigated were malathion, DDT, aldrin, dieldrin, captan, benzene hexachloride (EHC), 2,4-D, and 2,4,5-T. The water treatment processes included aeration, chemical coagulation, adsorption on activated carbons and clays, and foam separation. The removal of pesticides from water by aeration was found to be significant. Dieldrin was removed almost 100%, while aldrin, DDT, and EHC were removed to a lesser extent. 2,4,5-T and captan showed no loss through aeration. Chemical coagulation alone was found to be ineffective in the removal of pesticides from water. Several coagulant aids were investigated but all proved ineffective with the possible exception of one which increased the apparent removal slightly. Of the processes investigated adsorption with activated carbon was determined to be the most effective in removing pesticides from water. The removals obtained were: malathion near 100%; 2,4-D, 90%; DDT, 95%; aldrin, near 100%; dieldrin, 90%. FWPCA Contract WP-00476-02 and OWRR Contract 14-01-001-911. Has 51 references.

R202979 67A

Whitehouse, James D

STUDY OF THE REMOVAL OF PESTICIDES FROM WATER

Water Resources Inst Res Rep 8, 1967. 175 p, 64 illus, 5 tab, 51 ref

University of Kentucky, Lexington

DESCRIPTORS. / *pesticides/ aeration/ adsorption/ *water/ sanitary engineering/ water treatment/ coagulants/ bibliographies/ *pesticide removal/ aldrin/ DDT/ dieldrin/ 2,4-D/ foam separation/ 2,4,5-T/ coagulation

IDENTIFIERS .. / malathion / captan / benzene hexachloride

R202980 66A ALGAL GROWTHS IN LAKE SEBASTICOOK, MAINE The purpose of this study was: (1) to identify major sources of nutrients to Sebasticook Lake, (2) to assess their significance, and (3) to recommend the most feasible nutrient control measures that will effect a lasting reduction in the aquatic growths. These nuisance growths are caused principally by nutrients contained in domestic and industrial plant wastes that are discharged to the east branch of the Sebasticook River at Dexter and Corinna, Maine. These nutrients produce as much as 9,700,000 pounds of algae as a standing crop within the lake during those days of the year that are optimum for algal development. Algae are swept by winds and waves into bays and coves where they decompose in the hot sun forming a "green-paint" covering on rocks, boats, and piers, releasing a pungent pig-pen odor in decay. Chemical control of the algal nuisance would be temporary, would require repeating several times throughout a growing season, and could cost as much as \$40,000 annually. Algae would develop between treatment, negating control. Several recommendations are given to effect a lasting reduction in the extent of aquatic growths in Lake Sebasticook. Among these are initiation of good housekeeping practices at the sources of pollution. Has 44 references.

R202980 66A

Anon

FERTILIZATION AND ALGAE IN LAKE SEBASTICOOK, MAINE

Federal Water Pollut Contr Admin Rep, Jan 1966. 124 p, 12 fig, 28 tab, 44 ref, append

Federal Water Pollution Control Administration, Cincinnati, Ohio

DESCRIPTORS-/ *algae/ wave action/ water pollution/ sewage treatment/ plankton/ waste disposal/ water utilization/ dissolved oxygen/ domestic wastes/ sediments/ water treatment/ bibliographies/ lakes/ *nutrients/ *eutrophication/ industrial wastes/ *fertilization/ *algicides/ diatoms

WATER POLLUTION

R202983 67A INDUSTRIAL WASTE FROM PETROLEUM REFINING
This industrial waste water profile covers the petroleum refinery
industry in the United States as defined by Standard Industrial
Classification 2911 of the U S Department of Commerce. It does not
cover the production of crude oil or natural gas from wells or the
natural gasoline and other operations associated with such production.
Transportation of petroleum products is covered only to the extent that
it is a part of refinery pollution control, such as treatment of
ballast water. The principal areas of discussion are: (1) the fundamental manufacturing processes and their patterns of use, (2) water use
and reuse, (3) waste quantities and characteristics, (4) waste
reduction practices (including both waste treatment and in-plant
processing) and their effectiveness, and (5) waste treatment costs. In
each area of discussion trends have been projected to or estimates made
for the situation expected in 1977. Has 96 references.

R202983 67A

Anon

COST OF CLEAN WATER, VOL III: INDUSTRIAL WASTE PROFILES, NO 5

Federal Water Pollut Contr Admin, Publication IWP-5, 1967. 74 p, 24 fig, 19 tab, 96 ref, 6 append

Federal Water Pollution Control Administration, Washington, D C

DESCRIPTORS.-/ wastes/ *industries/ water reuse/ waste disposal/ costs/ industrial plants/ economics/ water quality/ treatment facilities/ *oil industry/ *oil wastes/ byproducts/ industrial wastes/ waste water disposal/ waste water treatment/ waste treatment/ bibliographies

IDENTIFIERS -- / *refineries

WATER RESOURCES

R202962X67A RECREATIONAL USE OF INLAND WATERS
An indepth analysis of applicable case law allocating ownership and access rights to inland water resources is given. Consideration is directed at the historical development of pertinent principles of water resource allocation adopted by the several states. Attention is directed at the potential for realizing recreational objectives in the context of existing case law. Alternative plans are presented for absorption of recreational inland water facilities by governmental acquisition. Has 82 references.

R202962X67A

Reis, Robert I

POLICY AND PLANNING FOR RECREATIONAL USE OF INLAND WATERS

Reprint, Temple Law Quart, Vol 40, No 2, pp 155-193, 1967. 39 p, 82 ref

University of Connecticut, Storrs

DESCRIPTORS.../ *riparian rights/ *recreation/ bibliographies/ lakes/ reservoirs/ streams/ planning/ *water laws/ water utilization/ boating/ navigable waters/ eminent domain/ lake beds/ water sports/ tidal waters/ recreation demand/ recreation facilities/ watercourses (legal)

IDENTIFIERS--

WATER RESOURCES

R202976X67A CONNECTICUT WATER LAW

More than 200 Connecticut water right cases are reviewed to give a historical perspective and a basis for future planning, developing, and allocating water resources. The courts have developed 4 distinct water categories: (1) public surface water flowing in a definite channel, (2) private surface water flowing in a channel, (3) ground water, and (4) diffuse surface water. This classification respectively involves public and private rights in public water, riparian rights, ground water rights, and surface water. Although the classification is arbitrary and may not always be in accord with the physical nature of the problem, the system forms the basis for the discussion of legal rights and the use of water in Connecticut. A chronological listing of Connecticut water law cases and pertinent sections of Connecticut General Statutes are given in the appendices.

R202976X67A

Reis, Robert I

CONNECTICUT WATER LAW: JUDICIAL ALLOCATION OF WATER RESOURCES

Inst Water Resources Rep 4, Univ of Connecticut, 1967. 215 p, 6 append

University of Connecticut, Storrs

DESCRIPTORS../ *riparian rights/ beaches/ reservoirs/ recreation/ real property/ surface water/ navigable waters/ Connecticut/ eminent domain/ *Federal-State water rights conflicts/ groundwater/ prescriptive rights/ *water law/ tidal waters/ reclamation/ *water rights/ legal aspects/ judicial decisions/ watercourses (legal)

R202937 66A REMOTE SENSING

Remote sensing is acquisition of information about an object or phenomenon not in intimate contact with the information-gathering device. Our natural remote sensors, i.e., eyes, ears, and skin, are surprisingly limited in this respect, and we have had to supplement them over the years with a variety of devices for measuring emitted radiation and force fields, thus enabling events to reveal themselves. Today, remote sensing techniques are beginning to yield otherwise unobtainable information about the world around us. Some examples are: (1) detecting forest fires with infrared sensors, (2) mapping ice thickness and distribution with microwave devices, (3) spotting diseased crops with certain cameras, and (4) measuring moisture content of soils with radar. These and many other applications have aroused enthusiasm among a diversity of scientists in areas ranging from agriculture to zoology. Ability to acquire data is far ahead of the ability to interpret and manage it. Probably 90% of the data gathered to date has not been utilized. Much of the promise of remote sensing will be lost if more efficient processing and use of data are not developed.

R202937 66A

Parker, Dana C and Wolff, Michael F

REMOTE SENSING

Pap Remote Sensing Environ, Amer Soc Photogram, July 1966. 12 p, 8 fig, 1 tab

DESCRIPTORS../ *sensors/ infrared rays/ *radiation measurement/ *aerial photography/ *radar/ satellites (artificial)/ environment/ snow surveys/ electromagnetic properties/ cameras/ wave length/ photographs/ thermal radiation/ photography/ ultraviolet rays/ electromagnetism/ microwaves/ agriculture/ geological surveys/ hydrology/ oceanography inference sensing/ color photography/ infrared imagery/ ice cover

MISCELLANEOUS

MISCELLANEOUS

R202963 66A DOLINE LAKE LIMNOLOGY

Few investigations have been carried out on limestone sink or doline basin lakes in any area of their occurrence. Almost no information is available on the Florida lakes. The purpose of this investigation was to characterize 2 such lakes (with differing physical features) in terms of physical, chemical, and biological parameters and to attempt to determine the factors which limit biological productivity in these lakes. This report contains a summary of the field and laboratory work carried out in investigating 2 lakes, Lake Mize and Newman's Lake over 2-yr periods, and a third, Biven's Arm over a 1-yr period. All 3 lakes are in Alachua County, Florida. This is the final report to the Federal Water Pollution Control Administration on Grant NIH WP 00530 01-3, January 1, 1964-December 31, 1966.

R202963 66A

Nordlie, Frank G

CHEMICAL AND BIOLOGICAL DYNAMICS IN TWO SOLUTION LAKES

Federal Water Pollut Contr Admin Rep, Bethesda, Md, Dec 1966. 53 p, 15 tab, 14 fig, 4 ref

University of Florida, Gainesville

DESCRIPTORS../ limestones/ *limnology/ *lakes/ physical properties/ chemical properties/ measurement/ water analysis/ water quality/ plankton/ aquatic life/ lake morphology/ *sinks/ Florida/ *biological properties

IDENTIFIERS./ Lake Mize, Florida/ Newmans Lake, Florida/ Bivens Arm Lake, Florida

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